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Solving the Problems of the Postwar Medical Department

Major General R. W. Bliss, The Surgeon General, *USA*

THIS discussion of the future of Army medicine takes as its point of departure recent developments in the Medical Department of the Army for the purpose of outlining the contours of the future. Both in peace and in war, the Army must always be preoccupied with the future. However, to appraise the future intelligently one must be in possession of the essential facts of the past.

I would like to begin with the definition of the mission of the Medical Department. Reduced to the simplest terms it is: To keep the Army well and to care for it when sick. We actively perform our mission in peacetime and in war. The Medical Department is in a perpetual state of war.

Three Major Aspects

It is feasible to distinguish three major aspects of our mission: First, our work in prevention; second, since we do not always succeed in prevention, we must concern ourselves with therapy; and finally, we must strive to improve both our methods of prevention and treatment by discovering new knowledge and improving our application of old knowledge—in short, research is our third major responsibility.

The field of preventive medicine can be usefully subdivided into its physical and psychological sectors. On the physical side, the Medical Department works to control disease by its efforts in sanitation. Here, the doctor is assisted by many other specialists, such as the sanitary engineer, the bacteriologist and the biochemist. Immunization plays a large role in preventive work. Insect and rodent control is a field of importance—one can say that we are engaged in a never-ceasing warfare with the carriers of disease. Finally, passing mention should be made of the antibiotics, which, in layman's terms, means nothing more or less than the use of safe organisms to kill dangerous organisms. So much for the physical side of preventive medicine.

Psychiatry

Now a word about the psychological aspects of the problem. It would scarcely be an exaggeration to say that one of the most important advances in twentieth-century medicine—and there were of course many advances during this period—was centered around the work of psychiatry. We have learned rather slowly and haltingly, but nonetheless we have finally learned the lesson that a healthy mind is a precondition for a healthy body; and

In accomplishing its mission of keeping the Army well, and caring for it when sick, the postwar Medical Department is stressing high professional attainment for its personnel, and quality of service

that a mind which is not healthy is always a prelude to breakdowns in the body.

On the preventive front, psychiatry can make an important contribution in the process of selecting manpower for an Army. It can screen out those individuals who give little promise of being able to adjust to military conditions. Perhaps even more important is the assistance which it can offer with respect to assignment. What we did during the last war was wasteful—very wasteful indeed. Many men who could have been used to good advantage were not taken into the Army; and many men who could have continued to serve the Army effectively were prematurely released because we had not worked out a sufficiently elaborate system of assignment in which account was taken of the abilities and desires of the men.

Preventive psychiatry also involves such considerations as the length of a tour of duty, methods of discipline and reward, indoctrination and recreation—in short, all the important factors that influence morale. It is particularly important to stress the fact that in all preventive medicine, physical and psychological, the Medical Department can do much, but not alone. In every case, it is a question of coordination between the medical specialist and his commander. There are no secrets about preventive medicine. Everything that is known about it should be taught and retaught to everyone.

The care of the sick is really the easiest aspect of our mission. We have had much experience in evacuation and hospitalization. Although good facilities, good supplies, and good administration are prerequisites for good therapy, the key requirement is, of course, good professional personnel. This means more than a good surgeon or internist. What is really involved is a skilled medical team—specialist, intern, nurse, physiotherapist, dietitian, and technician. All too often the outsider fails to realize that good medicine is always a question of a team, never a single individual.

Importance of Science

If there be any one fact that typifies science—and medicine is of course a branch of science—it is that science, in pushing back the frontiers of the unknown, can improve the practical applications of its body of knowledge. Research is the key to improvement. These days the Medical Department is very much concerned with research in atomic problems and related areas. Since the quality with which we perform our mission can be improved through more effective administration, we are devoting some effort to research in the general field of management.

This discussion of the mission of the Medical Department can be summarized in these terms: Our objective is to keep the manpower of the Army at the highest possible pitch of efficiency, to provide the best care for the sick and injured, and to discover new and improved methods of preventive and therapeutic medicine.

The background of our present situation can be simply outlined. Prior to World War II, the Army Medical Department was a substantially self-sufficient organization. The Medical Corps numbered approximately 1,000 doctors. For many reasons a career in Army medicine in those days was relatively attractive. The Army was in a position to offer pay to a young man while he interned in one of its hospitals, which was not true of civilian hospitals. We were able to recruit every year the number of interns sufficient to fill our needs. Out of each intern group we were able to gain sufficient members for the Regular Army to take care, on the average, of our attrition. For the most part we had little or no contacts with civilian medicine. We went our own way, with a total patient load of scarcely 10,000. Most of our hospitals were small



Professional development of its personnel is one of the main objectives of the post-war Medical Department. Above, a class at the Army Medical Department Research and Graduate School. Lower right, viewing an experiment in nutrition. Lower left, a million volt X-ray machine at Walter Reed General Hospital.—US Army photos.





units scattered among a large number of outlying posts. The best of Army medicine was to be found in the few large general hospitals in the United States.

War Changes

The war brought tremendous changes. Almost every one of the thousand Regular Army medical officers was forced to leave professional work and assume an administrative post. The professional work of the Army Medical Department was performed by the 45,000 civilian physicians who were called to active duty. These civilian physicians represented a cross-section of American medicine, and as such there were included in their ranks a considerable number of outstanding specialists.

From a hospital system of 10,000 beds the Medical Department expanded until it was operating a thousand separate hospital units, with approximately 650,000 beds. The rate of expansion can best be typified by emphasizing that a single medical installation such as Percy Jones Medical Center at Battle Creek, Michigan, had more patients on its rolls in early 1945 than were to be found in all the hospitals of the Army in 1938.

It might not be considered proper for The Surgeon General to boast of the remarkable achievements of Army medicine during World War II, a period marked by new lows in our morbidity and mortality rates. Our losses were strikingly less than those of our allies and our enemies. Since the bulk of the professional work in the Army was performed by members of the civilian medical profession who had donned uniforms, reference to these accomplishments might not be considered out of place. The contributions of the Regular medical officers were likewise remarkable but the greater part of the task was done by the very much larger number of civilians.

Low Ebb of Morale

Despite the achievements of Army medicine during World War II, the morale of the Medical Corps was at a low ebb on VJ-day. The Reserve, National Guard, and AUS officers were very critical of their military experiences. They were dissatisfied; in fact, they were disgruntled. Careful studies were made of the attitudes of these doctors as they left the Army to return to civilian life. As is usual when people are disgruntled, their complaints were manifold. There is no point to reviewing the causes of their dissatisfaction in detail. These civilian doctors felt that the Medical Department had not been in sufficient control of its own destinies. But their resentment was not limited to such general considerations as the prestige of the Medical Department. They were particularly resentful of the unsatisfactory promotion system which had held so many of them prisoners at the grade in which they had entered the service. Neither years of service nor distinguished accomplishment could insure them promotion. They were trapped by what they considered a vicious Table of Organization system.

The extreme negativism of these civilian doctors,—and it really was extreme—greatly complicated the post-war readjustment of the Army Medical Department. The Medical Department was confronted with the need to expand the size of all its Corps to care for the much larger number of troops in the post-war Army. There was only one source of recruitment—that was the civilian community—either among the men who had served or among the younger men who had been deferred from service.

Difficulties of Procurement

Few who served were interested in a Regular Army career. Some recruitment would have been possible had the Medical Department been able to make firm offers to these doctors prior to their return to civilian life. Unfortunately, the Medical Department had to wait upon the

formulation of the over-all plan for integration, and by the time this plan had been completed the most likely sources of supply were no longer available.

Because of the poor morale with which these civilian doctors left the Army, efforts to interest any large number of the younger men who had not yet seen active service were greatly handicapped. After all, the young men sought the advice of the older men, especially those who had served. We know for a fact that many a young man was specifically discouraged from joining the Medical Department.

The end of the war not only found us with a vast potential deficiency in the numbers required by the Regular Corps—potential, because in the interim period which is just now running out, we had the advantage of two years' service from each of the young men who had been deferred from service during the war under the provisions of the Army Specialized Training Program. We were also confronted with a loss of professional skills on the part of our own Regular medical officers who, as previously mentioned, had been deflected into administrative work early in the emergency.

So you can see that we were handicapped. It had been clear to my predecessor, General Kirk, just as it had been long clear to me, that the problems confronting the Medical Department in the post-war period necessitated fundamental reform. Superficial solutions would not



Brooke General Hospital, Fort Sam Houston, Texas, is one of the outstanding medical institutions in the postwar Army Medical Department

suffice. The first step was to redefine the objectives of the Medical Department; the second, to secure the means of realizing these objectives.

Postwar Aims

The principal aims of a virile Medical Department in the postwar Army necessitated the attainment of three objectives: The establishment and maintenance of quality medical care, both in its preventive and therapeutic aspects; maximum possible coordination among the several subdivisions of the Army charged with providing medical service (and with unification, this had to be broadened to include the Navy) so that a high level of service could be performed in the most efficient manner possible; and finally, the broadening of the scope of the Medical Department's work so that it fully encompassed what a great British leader of military medicine has defined as "total medicine."

Professionalism is the key to accomplishing these aims. Only a Medical Corps in which the members can grow professionally will be able to provide quality service. Professionalism had, however, a further justification. We knew from attitude surveys—in fact, these confirmed what we had previously surmised—that young men would consider an Army career only if they could grow professionally. At the best, our procurement problem was difficult. In the absence of a strong professional program, it would be hopeless.

Post-Graduate Training

The heart of a professional program was the provision of multiple opportunities for post-graduate training. It is true of all fields, but particularly of medicine, that classrooms and books do not make a school—that the quality of training is always dependent on the quality of the teaching staff. It was important for the Army to set its sights in favor of wide-scale graduate training, but little if anything could come of these efforts unless provision was made to integrate this program as closely as possible with civilian medicine. The teachers that the program required could be found only in the civilian community.

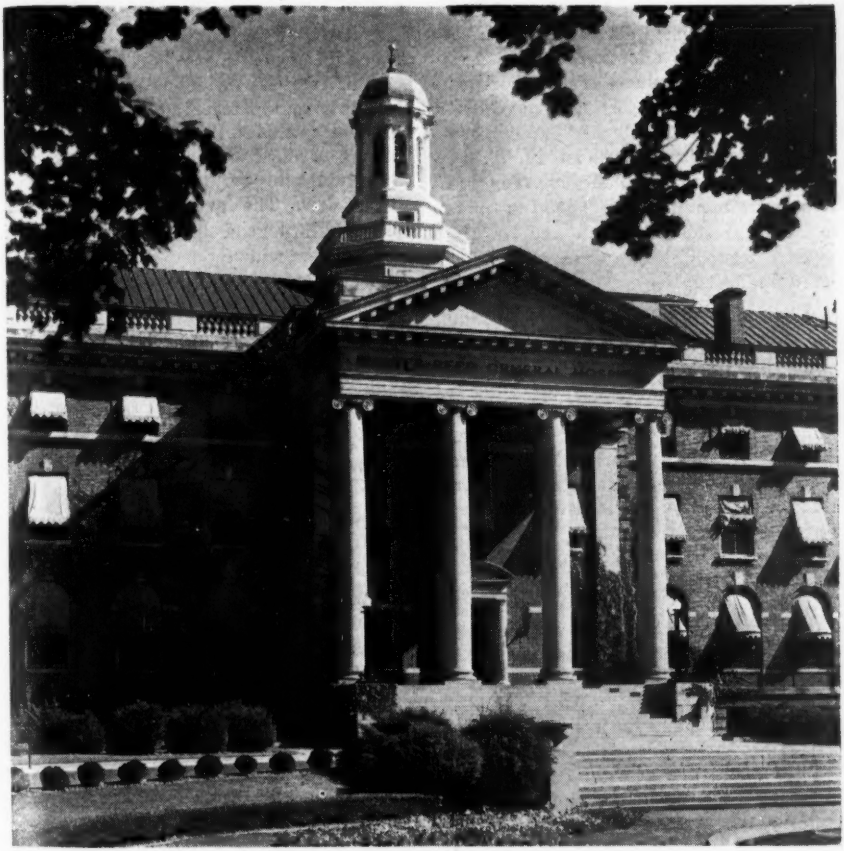
In discussing our pre-war experience, reference was made to the long established system of internships in Army hospitals. When funds permitted, the pre-war Army would send a few of its medical officers to a civilian institution for specialized study. But on the whole, its training program was severely circumscribed.

Without going into detail about the expansion and transformation of our medical training program since the war's end, I do want to point to at least a few of the accomplishments. We have not only continued but also vastly expanded our internships. Despite the general difficulties of procurement, we nonetheless have had a sufficiently large number of good young doctors applying to enable us to select only the more promising candidates.

Residencies

There was a time, not so long ago, when a young doctor set up in practice at the completion of his internship. But civilian practice has been undergoing a radical change during these last years, a change which the Army must recognize. Every young man who wants to be a good doctor now seeks a residency and, if at all possible, strives to prepare himself for certification by a Board in the specialty in which he hopes to concentrate. A residency is an additional two or three years of advanced hospital internship training. On the average, it requires about five years of post-graduate education to qualify for a specialty Board.

In recognition of this trend, the Army Medical Department had only two alternatives—to follow it by providing residencies for its men, or to cut itself off from the major stream of American med-



Walter Reed General Hospital, famous medical installation of the Army's Medical Department.—Army Medical School photo.

icine. Needless to say, it did not do the latter.

We now have several hundred residencies in our Army hospitals. We developed a very ingenious arrangement whereby the instructor in Military Science and Tactics who is responsible for the ROTC program at a medical school is assured a residency or an advanced fellowship. Since we have ROTC programs in some forty-four medical schools, we have increased our available residencies by a sizeable percentage over and above that which the Army hospitals alone could provide. We are exploring a still further expansion of residencies in civilian hospitals.

Since such a large percentage of the total troop strength of the Army is stationed overseas, which in turn implies

that a large portion of our Medical Corps is likewise stationed abroad, we have been devoting special efforts to the development of a post-graduate training program in overseas theaters. We now have teams of three civilian and service doctors—each a recognized specialist in his particular field—going to the overseas theaters each month. They spend a month in actual residence which enables them to devote two or three days at each major installation.

Army medicine suffers certain liabilities when compared with civilian medicine, but it also has certain advantages. We are doing what we can to maximize our advantages. In addition to training specialists, we are working out a balanced program for the training of the general practitioner, which, to the extent we succeed, will enable us to lead civilian medicine. The most thoughtful medical educators are agreed that the pendulum has already started to swing back from the extreme concentration on specialization to a more balanced relation between the specialist and the general practitioner.

Atomic Medicine

Then there is the work in atomic medicine and in the revision of our basic science course. There are already 600 graduates of the atomic medicine course. In this respect, the Army Medical Department has led the country. We are also making great strides toward a more effective integration between the didactic, laboratory, and clinical aspects of the teaching of the basic sciences in medicine, a program that will probably enable us to make a major contribution to medical education in this country.

In establishing this far-flung training program, the Medical Department would have been halted at the very start had it not been able to elicit the cooperation of a large number of leaders in American medicine. It is the civilian group that is carrying the major burden of the didactic work in connection with our residency program. Some 850 of the leaders in American medicine are active participants in the teaching program in the Army hospitals in this country. The Deans of the Medical Schools have cooperated by establishing residencies for our ROTC instructors. The overseas training program will depend largely upon civilian experts who will visit the theaters as members of a team. The basic science course is being worked out in collaboration with the foremost leaders in medical education. In short, the professional revolution which is taking place in the Medical Department of the Army is inextricably bound up with the civilian community.

Our relations with civilian medicine have been important in still another area. The Surgeon General's office is constantly receiving the benefit of advice and direction in its planning from the Medical Consultants Society of World War II, whose membership contains many of the ablest men in American medicine who saw service during the recent war. And when the Secretary of War and the Chief of Staff sought to help the Medical Department in overcoming its serious procurement difficulties they called upon a group of civilian leaders whose thoroughgoing analysis of the problem did so much to convince Congress of the need for remedial action. We have come a long way from the pre-war situation in which the Army went its way, and civilian medicine its way. Today the two march together.

Our present position and future prospects can be easily summarized: We have really one problem, at least one intractable problem. The regular Medical Corps is at least 50 per cent under-strength. The resources available for bridging the gap—the young ASTP doctors—will, before too long, be lost. Our major preoc-

cupation is with procurement. We are probably over the low point. We are not only holding our own—we are gaining a little. But we are still far short—very far short—of our goal. Despite the pay increase of $100 a month which Congress granted us, the pay of medical officers still compare unfavorably with that of doctors engaged in civilian practice, where incomes today are at an all-time high.

We have established and are expanding our elaborate postwar training program. We feel that this will not only help us to procure men, but will also help us to train them to the proper level of competence. It is not only numbers, but quality, which presents a challenge to the Medical Department.

Coordination

Secretary of Defense Forrestal recently appointed a committee composed of the Surgeon General of the Army, the Navy, and the Air Surgeon, with General Hawley as chairman, to see what could be done to improve coordination among the three medical services. This committee has been at work only a short while, but it is to be hoped that out of its detailed considerations will come many helpful suggestions which will contribute towards a more efficient medical service. One likely reform will be the establishment of area medical officers who will be charged with the responsibility of utilizing all medical means within the area in the most efficient possible manner, irrespective of the problem of service jurisdiction.



Drawing of the Army Medical Department's Tripler General Hospital, Island of Oahu, Territory of Hawaii.—Corps of Engineers.

In discharging its broad mission, the Medical Department cannot depend solely on itself. Especially in its work in preventive and psychiatric medicine, there

must be the closest coordination of command and medical effort. We have seen that with war's end, the Medical Department had to undergo a series of revolutions, the most important of which was the establishment of a high level of professionalism. We have also seen that this revolution has been largely completed, and successfully. In carrying it out, the Medical Department's relations with civilian medicine underwent a major transformation. We have become part of it, and it has become part of us.

We are still face to face with the most serious shortages in personnel. There is nothing on the horizon which gives one much confidence of a speedy solution to this difficulty. But we are working on it ceaselessly. We have succeeded in eliciting the help of the civilian community. It goes without saying that the Army must do all that it can to help. To attract doctors to an Army career we must offer reasonable professional opportunity coupled with conditions under which the normal amenities of life are available.

Despite the procurement threat which hangs over all of us, we are facing the future with restrained confidence, for we believe we have built soundly. If we are right in this belief, it is only a matter of time until our efforts will be rewarded. Whether we have our full complement of personnel or not, the Medical Department will continue to serve the Army to the very best of its ability, placing before all else the motto—"QUALITY."

In a group of 500 enlisted men with psychoneurosis seen in an evacuation hospital in the South Pacific, 79 per cent were definitely neurotic before entering the service. It would seem that many of these crippled personalities should not be considered war casualties. The majority were replacements in old well-organized units with long overseas service. These newcomers broke under minimal stress with little or no combat or disease and after only short periods of overseas duty. Few were wounded. Neuropathic childhood, broken homes, and adult maladjustment were the rule. Overseas duty seemed a much more potent precipitating factor than total length of service Age and education did not seem important. As a rule the better-adjusted soldier became a neuropsychiatric casualty only after great stress, such as long overseas duty, much combat, and disease. The importance of the possibility of physician-produced neurosis, especially cardiac, gastric, and lumbar, in persons susceptible to suggestion is emphasized. The results of this series of 500, and of another about the same number treated subsequently, agree with the principles governing the prognosis of war neurosis as given by Strecker—namely, the more stable the premilitary personality, the more severe must be the precipitating stress and strain, and the sooner the neuropsychiatric treatment is given, the more favorable the prognosis.

The Bulletin of the U.S. Medical Department

Variations in Staff Organization

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Introduction

ONE of the resources provided the commander for the accomplishment of his mission is a staff. It is normally provided according to a pre-conceived organizational pattern based on the situations likely to be confronted by a unit of the type he commands. When situations are encountered differing widely from the usual, the commander is free to vary his staff's organization *as necessary*, within the limits of the personnel and grades allotted to him. In order to preserve the same general pattern of staff organization throughout the Army only *necessary* changes are condoned by United States Army staff doctrine.

It follows that every commander has two main responsibilities as regards the organization of his staff. First, he is expected to preserve, to the extent practicable, the advantages which accrue from employing the standard type of staff organization commonly used and commonly understood throughout the Army. Second, he is expected to vary this standard type of staff organization *as necessary* to meet conditions peculiar to his mission and situation.

To meet these two responsibilities, a commander must understand the following factors which will influence his actions thereon:

(1) The advantages of the standard organization.

(2) The criteria for determining when to adopt one or another of the several possible variations in the standard organization.

The purpose of this article is to discuss these two factors as they apply to the general staff type of staff organization.

Advantages of Standardization

Standardization has five major arguments in its favor which are as follows:

(1) Flexibility in operations.—We must be able to move corps, divisions, and other units from one command to another with the minimum of administrative and procedural disturbances. We would increase the procedural troubles immeasurably if each commander organized his staff entirely according to his own fancies. The flexibility displayed in World War II in the tactical employment of our forces was in large part possible because we used a standard type of staff organization and staff procedure.

(2) Facility of training.—There can be no general development and training of

While the commander is expected to preserve the advantages of the standard type of staff organization, he may introduce variations as necessary to meet the conditions of his mission and the situation

staff personnel unless we adhere to a general pattern of staff organization, allocation of duties, and procedures.

(3) Speed in staff operation.—Speed in staff operation is facilitated by a standard staff structure, because successive or parallel echelons can be working on a given problem, simultaneously, in a way that is commonly understood. Thus, intelligence and supply plans for an airborne operation can be worked out simultaneously at corps and division levels with greater efficiency if each has the standard type of staff than they could be if one of them had, let us say, no intelligence section, but had the intelligence functions divided among the other staff sections.

(4) Continuity of policy and procedure.—A standard staff organization promotes continuity of policy and procedure. In modern war, changes of commanders and staff officers are necessarily numerous and frequent. Adherence to a standard system of organization and procedure minimizes the interruption of normal operation. The staff policies and staff procedures established by one commander will require a minimum of alteration by his successors in command, as long as all employ the standard staff organization.

(5) Supervision of execution of plans and orders.—A standard staff organization facilitates supervision of the execution of plans and orders of the commander. Thus, if the counterintelligence teams are employed under the intelligence section in all echelons of command, the supervision of counter-sabotage plans is much simpler and more effective than it would be if they were under a different section in each command.

The above five reasons are sufficient to demonstrate that a standard staff organization is desirable. The United States Army has had adequate experience since the establishment of the General Staff in 1903 to formulate and test the general pattern outlined in our staff manuals. Departure therefrom should be made only after the most careful consideration of the pros and cons.

Variations in Organization

Despite the strong reasons for standardization, the fact remains that the first purpose of staff organization is to provide a structure which will facilitate the accomplishment of the commander's mission. Local conditions affecting the accomplishment of the mission may, therefore, dictate variations from the normal staff structure. The following are some of the variations which may prove necessary in given situations:

(1) Employ deputy chiefs of staff as an added echelon between the chief of staff and general staff.

(2) Employ more than four general staff sections.

(3) Employ a separate planning section.

(4) Employ "functional grouping" in the staff.

(5) Allow the staff to issue orders directly to subordinates.

(6) Transfer special staff sections to the personal staff group.

Let us now proceed with a discussion of each of these variations, the reasons behind the standard organization in each case, and the criteria for determining when to adopt each variation.

Deputy Chiefs of Staff

A supervisor can normally supervise directly only from three to seven subordinate supervisors. This limited "span of control" is one reason for providing the chief of staff with four assistants, the general staff chiefs. Through them the chief of staff is able to deal with the entire staff when he so desires.

Usually, the chief of staff finds it within his "span of control" capabilities to handle these four assistants, who, in turn, are adequate to coordinate the func-

tions of fifteen or twenty special staff sections. Normally, therefore, there is no need to insert deputy chiefs of staff as additional echelons between the chief of staff and the general staff chiefs. To do so has the disadvantage of a step upward and laterally in the staff channel of coordination.

Nevertheless, the employment of deputy chiefs of staff as an added echelon may become necessary under one or more of the following conditions:

(1) When the chief of staff has duties normally assigned to a deputy commander. This situation often occurs when there is no deputy commander, and when the commander is frequently absent from the headquarters for long periods.

(2) When problems coordinated by the chief of staff are of such wide scope and signifiance—as in a Theater, Joint, or Allied headquarters—that the supervision of even four or five general staff chiefs taxes the "span of control" capabilities of one man.

Adding Sections to the General Staff

The G-1, 2, 3 and 4 system is a good one and one that works in the majority of cases. It complies with the principle of "span of control," limiting to four the number of staff officers the chief of staff must supervise directly. It provides a number of coordinators adequate, usually, to coordinate the functions of the special staff. It groups the functions of the commander into the four natural and all-inclusive fields of personnel, intelligence, operations, and logistics. These four fields are so all-embracing that any additional field proposed will be found to be, in fact, a part of one of these fields. Their all-inclusive nature assures that every responsibility of the commander will be taken care of and integrated into the whole operation.

However, it is quite appropriate to set up an additional coordinating section when circumstances require. These circumstances may arise as a result of:

(1) An increase in the volume and scope of duties of one of the general staff sections. It was for this reason that plans and operations were separated from the pre-war G-3 in the War Department to form the Plans and Operations Division. For similar reasons, civil affairs were separated from G-1 and became a general staff section in Europe.

(2) Emergence of an activity in which the coordinating function becomes of critical importance as was the case for a time for new developments on the Department of the Army level.

Even though one or both of the above circumstances may indicate the need for an additional staff section, it should be a general staff section only if the scope of its responsibilities does in fact partake of the activities of other staff sections, including the existing general staff sections.

Separate Planning Sections

The standard staff organization does not include a separate planning section. Instead, all necessary planning within each general or special field is done by the appropriate general or special staff section, the coordination of these plans being accomplished by the general staff group.

This system utilizes as planners the personnel familiar, on a day-to-day basis, with the facts and policies in each field, and with their correct interpretation. It utilizes, as the coordinators of all plans, the regular coordinating group, the general staff. It follows the rule that existing agencies and resources should be fully utilized before creating a new agency. It also follows the rule of simplicity by avoiding the addition to the headquarters of one more section with which the four general staff sections and the special staff sections must deal. As a rule, then, a separate planning section should be permanently established only when:

(1) The volume and magnitude of planning and current operations are such that the general staff sections cannot produce complete, sound, and timely plans while engaged in conducting current operations.

(2) The direct connection between current operations and the future operations being planned is slight, as when the prospective operation involves entirely new areas and different troops, so that the planning advantages accruing from the knowledge and experience of members of the general staff regarding current operations are slight.

(3) The requirements for secrecy are so great that knowledge of the basis for planning and of the plans being produced must initially be limited to a very few persons.

Functional Groupings

The standard staff organization does not group special staff sections under any particular general staff section. Rather, all staff sections, general or special, deal directly with each other as necessary.

This arrangement permits any general staff chief to obtain directly the advice and recommendations of any special staff chief. It allows any general staff chief to coordinate directly those daily activities of any special staff chief which fall within his field of coordination. Thus, it speeds up coordination by allowing direct contact between any specialty and any of the four general fields of personnel, intelligence, operations, and supply.

While this system facilitates direct contact between sections of the staff, it has the disadvantage that there are as a result four channels of staff communication—one through each general staff chief—between the commander (and chief of staff) and each special staff section. It is possible for information, for example, to reach a special staff section through all four channels, and it is also possible for each general staff chief to assume that another general staff section is keeping a particular special staff section informed, so that none of them transmit the information to that section.

In order to tie every special staff section into a definite staff channel through which the commander's desires and other information will surely reach it, many headquarters use the device of forming the staff into groups. Each group consists of one of the general staff sections and those special staff sections most closely related, in their activities, to that general staff section. The general staff chief in each group is then made responsible for keeping his group informed. He may also, if desired, be given some measure of supervisory authority over the group, such as the authority to observe progress of the group in staff work, and to keep the commander informed of the status of work in the entire group. Such grouping does not give the general staff any command authority, nor does it operate to prevent direct contact between any of the staff sections of the headquarters. It operates simply to prescribe definite channels of communication in the staff.

The following is an example of one of several ways in which a staff may be grouped functionally:

Personnel matters	*Combat activities*	*Logistical matters*
G-1	G-3	G-4
Adjutant General	Antiaircraft Artillery Officer	
Chaplain	Artillery Officer	Engineer Officer
Judge Advocate		Surgeon
Provost Marshal	Signal Officer	Ordnance Officer
Special Service Officer	Chemical Officer	
Finance Officer		Quartermaster

The use of functional groupings may be necessary under one of the following conditions:

(1) In very large or dispersed headquarters.

(2) Temporarily, to assure dissemination of information to and coordination of the special staff in a fast-moving or complex situation, or in planning for which all sections of the headquarters are concurrently employed.

(3) In inexperienced staffs, to further fix responsibility and clarify channels of communications within the staff.

Issuing Orders

The staff is not normally allowed command authority. The commander normally prescribes that his staff has only the authority, with relation to subordinate commands, to exercise "staff supervision."

Allowing staff sections of the general staff type of organization to issue orders *in their own name* would violate the principle of unity of command. Since the same order will reach the same people if issued in the commander's name, and have far more force and effect, it is safe to say that there are practically no occasions when delegation of this command prerogative to the staff is warranted.

The issue of orders by the staff *in the name of the commander* is another matter. If the orders thus issued do not conflict with the commander's plans and policies, nor with orders issued by other elements of the staff, they do not violate unity of command, since they merely implement the decision of the commander. If the staff is authorized to issue orders in the name of the commander, the question of when to use such authority becomes essentially a matter of judgment on the part of the staff officer. He must judge whether in fact the commander would, himself, issue the order.

The safest procedure is to process recommended directives up to the chief of staff for approval unless exceptional conditions prevail. As a guide, then, the staff should be authorized to issue orders in the name of the commander without prior approval by the commander or chief of staff, when:

(1) A grave emergency exists, usually due to misunderstanding of the commander's desires, which requires immediate action.

(2) The staff has demonstrated that it possesses sound judgment and has a full understanding of the commander's mission, plans, and policies.

(3) The organization is of such size that all routine matters and many nonroutine matters must be cleared at a point short of the office of the chief of staff.

(4) The headquarters supervises activities in an extensive area, so that, on staff visits, dangerous conditions would be allowed to go on too long if corrective action had to await an exchange of messages or the return of the staff officer to his headquarters.

Staff Sections in the Personal Staff

Let us consider lastly those occasions on which a special staff officer might be placed in the personal staff group. The personal staff group consists of the commander's aides and such other officers as the commander wishes to deal with and coordinate directly, rather than through the general staff and chief of staff.

There can be no fixed rules for deciding when special staff sections should go into the personal staff group. However, here are some general guides for consideration. Sections may be included in the personal staff group:

(1) When the commander wishes to devote the necessary time and effort to serving as the only coordinating agency for their activities.

(2) When the functions involved are

so closely and frequently influenced by information and judgment possessed only by the commander that he alone can coordinate the functions adequately.

(3) When the matters being handled are such that it is desirable to withhold them, at least initially, from the knowledge and influence of the staff. Thus, certain personal investigations which the commander wishes conducted by the inspector general may be such that the morale and efficiency of the staff would be adversely affected if known to them at the outset, or may be such that the staff would have a personal interest in influencing the course or conclusions of such investigations.

(4) When the shifting of an entire section will not seriously hamper the functioning of the special staff—general staff team, or deny to the staff the technical advice and assistance that is needed in handling all aspects of the commander's functions. To illustrate, the moving of the Judge Advocate into the personal staff for all his functions might tend to deny legal advice to the remainder of the staff and prevent complete coordination of activities having legal aspects.

One solution to this problem is to assign special staff officers to the personal staff group only on a temporary basis from time to time, for the duration of a particular task or only for some particular function. For his other functions, then, the officer continues to be a member of the special staff group, contributing advice and recommendations to the entire staff organization. This compromise gives the commander direct supervision over those functions he desires to influence personally, while otherwise preserving the normal special staff organization for supervision and coordination when the commander is absent or preoccupied with other matters.

Summary

For the purpose of this summary, let us assume that you have been designated as the commander of a newly activated division or larger unit, and that you have charged your staff with recommending the final organization of the headquarters. One segment of your staff has concurred in recommendations based entirely on the so-called "standard" staff organization. Other elements have not concurred and have proposed numerous variations from the standard organization. The decision, as always, rests with you, the commander.

In your analysis of the problem, you will find the case for standardization a strong one. It facilitates training and promotes understanding. In the higher command of which your unit is a part, it promotes speed in operations and continuity of policy and procedures, aids in the supervision of plans and orders at all levels and, most important of all, increases flexibility in operations throughout the command. It is built on sound principles of unity of command, assignment of related functions, fixed responsibilities, avoidance of duplication of effort, span of control, clearly established relationships, and clearly established channels of communication and coordination, with a single channel of command from top to bottom of the staff. It has a history of successful operations which dates back to 1903 and carries through two major wars.

On the other hand, your primary task is the accomplishment of your mission and, in doing this, you must secure the best possible assistance from your staff. Perhaps, then, you do in fact require deputy chiefs of staff as an added echelon, a separate planning section, additional general staff sections, or a large personal staff group. Perhaps your staff should be allowed to issue orders directly to subordinates, and be departmentalized into functional groups.

In any event, the decision is yours to

make. The chances are nine out of ten that higher headquarters will leave it to you. However, in arriving at your decision the following must be carefully considered:

(1) The advantages of standardization, both to yourself and to the command of which your unit is a part, are too many to be abandoned without excellent reasons.

(2) The privilege of varying your staff organization carries with it the responsibility to make *only* those changes necessary to accomplish the mission.

(3) Changes should be made only after the most careful weighing of all "pros" and "cons" with a view of determining whether the changes will assist the exercise of command in the long run.

(4) The most important purpose underlying staff organization is the accomplishment of the objective. In the final analysis, actual conditions are the governing factor.

The past two wars have proved to the world that we are the major military power that would have to be defeated before any nation could dominate the world. Twice the Germans gave us the time necessary to gear up our great industrial plant, to call in the National Guard, to set up a selective service machinery, to raise and train the great land, sea, and air forces that we have produced. They gave us the time because our great ocean barriers and our allies prevented them from direct physical assault on our homeland. We feel that we will never again have that cushion of time. Airpower has knocked down our barriers. We can be subjected to attack in our homeland at the outset of hostilities. And this is the most profitable target an enemy could conceive of, because, if struck successfully, our power to mobilize our great internal resources—our mass production industry—may be crippled at the outset. This would be a prize so tempting that no intelligent world aggressor can be expected to overlook it. In the event of another conflict, we can bank on such an attack being made. Therefore, in all our planning we must recognize that time will no longer be on our side, that we will be the first nation, probably, that is struck. In all our calculations, then, we must consider what we are capable of doing immediately upon the outbreak of any possible future war.

General J. Lawton Collins

Our national economy cannot again stand waste in our conduct of war. Time and teamwork are the dominant factors in making maximum use of our strength. There must be unity of effort. Unification of our armed forces is one great step to this end.

Lieutenant General Raymond S. McLain

Improving the Technique of Reading *in* Service Schools

Colonel R. C. Cooper, *Field Artillery*
Instructor, Army Division, Air University

WHAT would it mean to you to be able to read twice as fast as you can today without losing any of your ability to comprehend what you read? Would it help you professionally? Would you get more enjoyment out of life?

If you can answer those last two questions negatively, you are exceptional. I will venture the estimate that most American officers undergoing courses of instruction in service schools today feel that they are using their facilities for reading and comprehending to capacity, and at the same time they are passing up a lot of "outside reading" they would like to indulge in.

To meet this challenge the Air University has established one of the largest and most complete "reading laboratories" in the United States. Recently twenty-eight students from the Air Command and Staff School completed a voluntary six-weeks course of instruction as a sort of "test-run" for the laboratory. Before beginning the course each student was tested for his reading speed and ability to comprehend what he has read.

The average reading speed for these twenty-eight, while maintaining 70 to 100 per cent comprehension, was 272 words per minute. After three one-hour sessions per week for six weeks they were given final tests to ascertain their new reading speed, while still maintaining the 70 to 100 per cent comprehension. Their final average speed was 530 words per minute, a 95 per cent improvement!

How do they do it?

The Theory

The theory is that there are five factors which may affect a person's reading technique. They are:

a. The Fixation Pause: The eyes must be "fixed" on a word or phrase to read it. The "fixation pause" is that moment at which the eyes are fixed at a point on a page in order to read words or parts of words. Consequently, the process of reading a line becomes a succession of fixation pauses.

b. Span of Recognition: Span of recognition is that part of the line which is read with each fixation pause. Obviously the reader with a wide eye span will be obliged to make fewer fixation pauses per line of reading material.

c. Regressive Movements: The reader regresses when he returns to a part of a line to read it a second time. This, of course, slows down his reading speed.

d. Vocalization: By vocalization is meant

In an unusual "reading laboratory," the Air University has improved on an idea from some of the progressive civilian schools of the nation and obtained improvements in reading techniques up to 95 per cent

reading with actual lip movement, or without lip movement, pronouncing the words to oneself. This is considered a deterrent to speed of reading.

e. Vocabulary: Unfamiliar words naturally slow down thought processes, and consequently slow reading speed. The advantage of having a broad vocabulary is therefore apparent.

It follows, then, that to improve one's reading technique one must:

a. Decrease the time of the fixation pause, or, in other words, increase the speed of recognition of words or groups of words.

b. Broaden the *span* of recognition.

c. Develop a regularity of procedure that will reduce the number of regressive eye movements.

d. Reduce or eliminate inward vocalization by speeding up silent reading.

e. Increase the vocabulary by more extensive reading. This will be facilitated as progress is made with the first four items, *a* to *d*, listed above.

How It Is Done

Two simple mechanical devices are used in the laboratory to accomplish the ends in view. They are simple, but they must be used systematically and over a period of several weeks, if they are to produce the desired results.

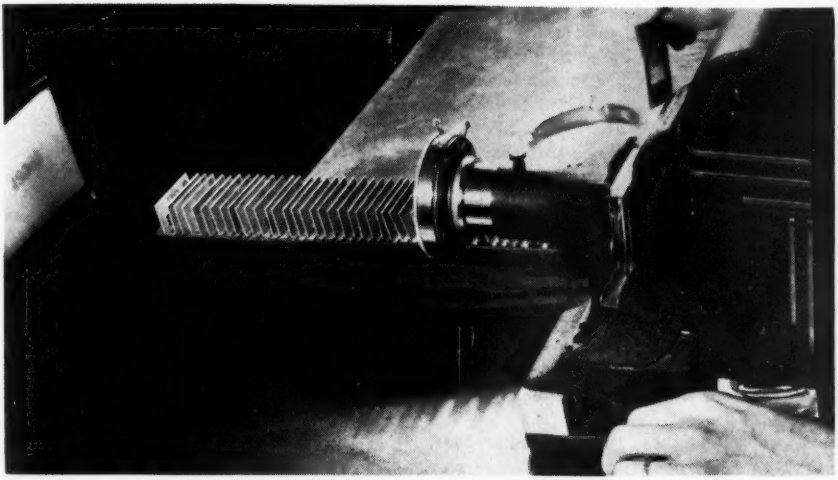


Figure 1.—The flash-meter.
The flash-meter is used to project groups of digits on the screen in measured time-intervals. The student usually starts his practice reading 5-digit groups flashed on the screen for 1/25 second. He gradually decreases the time-interval and increases the number of digits in the groups.

These mechanical devices are the flash-meter and the reading-rate controller.

The flash-meter (technical name, "tachistoscope,") came into use by the Air Force during the war as a means for training in aircraft recognition. It is a device for projecting views in measured time intervals (Figure 1). By systematic practice with the flash-meter, "speed of recogni-

tion" is increased and the "span of recognition" is broadened. Students are instructed to begin practice with slides of 5-digit groups flashed on the screen for 1/25 second. Twenty-five such slides are flashed on at one sitting, and three to five such practice sessions are engaged in each week for six weeks.

As the student approaches perfection in reading the 5-digit groups at 1/25 second, the speed and number of digits in the group are increased. The top efficiency expected of any student is to be able to read 9-digit groups accurately at 1/100 second. Few students reach this goal.

After each practice with the flash-meter the student takes approximately thirty minutes reading practice on the "reading-rate controller." This device (Figure 2) is designed to force faster reading. It can be set so that the center board in the center moves down the page so as to require a given reading speed. Each book to be read is loose leaf and in front of each book are listed the settings for various reading speeds (Figure 3).

With respect to the controller, Dr. Murry L. Miller, of the Air University Educational Advisory Staff, states:

"The controller does not improve complex comprehension processes directly but creates a situation which is favorable to their development. By pushing the reading rate up each day ten to twenty words per minute faster than the previous day, the controller sets a pace for eye movements and complex mental activity. When the reading rate goes above 350 words per minute, the student has overcome inward vocalization. No real progress in reading rate can be made until inward vocalization is replaced by silent reading habits. A reader cannot vocalize at rates faster than 170 to 250 words per minute. At 300 words per minute he may be able to vocalize every third or fourth word. At faster rates inward vocalization disappears. After that, speed will go up rapidly, reading at the end of six weeks perhaps 50 to 80 per cent of the maximum of which he is capable. After a rapid rate is attained, one or two weeks of practice is necessary in order to produce permanent learning. Permanent new reading habits will resist slipping back to old habits."

Scientific Eye Test

How can we determine just what the eyes are doing when we read? How can we check on the "span of recognition," "regressive movements," etc.? Science has provided an answer in the "Opthalm-O-Graph," an instrument which can photograph eye action during a given reading process. The eye movement is photographed into a film and these recordings can be read to give positive data on fixations per line, length of pause per fixation, regressive movements, and regularity of eye action.

The results of analysis of the film strips of a good reader and a poor reader in the process of reading the same material are shown by Figures 4 and 5. In these illustrations each of the vertical lines represents a fixation. The numbers at the tops of the lines indicate the sequence of the fixations, and the numbers at the bottoms of the lines their duration in thirtieths of a second.

Note that the good reader makes fewer stops per line and therefore has a larger eye span than the poor reader. He also spends less time per fixation than does the poor reader. Note that in this example the poor reader regresses nine times to the good reader's one.

Interesting Sidelights

To Colonel Charles M. Young, Jr., AF, goes a large part of the credit for establishing the reading laboratory in the Air University. Colonel Young was a student in the 1946-47 Class at the Air Command and Staff School. Following graduation from the United States Military Academy in 1938 he commanded a fighter group in the European Theater of Operations and lost his previous contact with academic

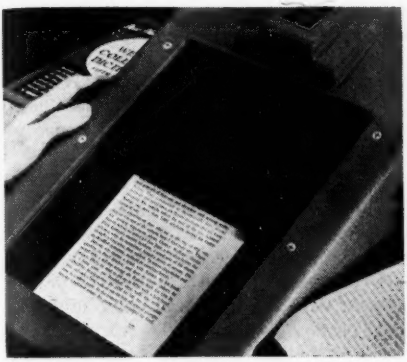
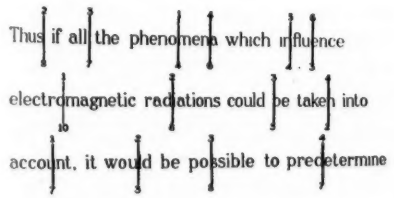


Figure 2.
The reading-rate controller. The controller can be set so that the center-board moves down the page at a rate that requires a given reading rate.



Figure 3.
In the front of each book used in the laboratory are listed the reading speeds corresponding to various settings on the reading-rate controller.

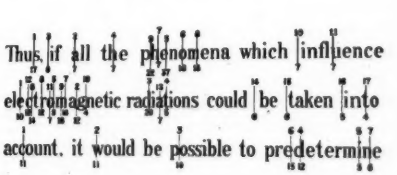
A GOOD READER



Fixations per line **5**
Thirtieths/second pause per fixation **5.8**
Regressions **1**

Figure 4.

A POOR READER



Fixations per line **12**
Thirtieths/second pause per fixation **11**
Regressions **9**

Figure 5.

Each of the vertical lines represents an eye "fixation." The numbers at the tops of the lines indicate the sequence of the fixations, and the numbers at the bottoms of the lines their duration in thirtieths of a second. Comparing Figure 4 with Figure 5, note that the good reader makes fewer "fixation pauses," spends less time per pause, and makes far fewer regressions than the poor reader.

studies. He was quick to recognize that he had a lot of reading to do, but was having a hard time getting around to doing it. In trying to find the solution to this difficulty, Colonel Young took a cue from several of our leading universities and set up a reading laboratory of his own in his quarters. The results he obtained just by using the flash-meter alone convinced him he was on the right track. He wrote his thesis on the subject, "The Air University Should Teach Reading Technique." He did such a good job in his thesis arguments that he sold the idea to the school and was directed to set up a laboratory in the Air Command and Staff School and supervise its initial operation.

In the process he worked very closely with the Educational Advisory Staff of the Air University, particularly Doctors Miller and Couey. Colonel Young has now moved on to another assignment and these two educators are in active supervision of the laboratory. They believe that the laboratory at the Air University is the most complete in the United States and is producing the best results. By combining the best features of civilian school laboratories, they feel they have hit on the real solution. For example, there is one school of thought in the civilian field which believes only in flash-meter. Another believes only in the reading-rate controller. So far as is known, the Air University is the only school using both in a coordinated effort, and they believe this accounts for its outstanding successes.

In his instruction memorandum to the students, Dr. Miller states: "Whether a student is a poor reader or a good one, the reading laboratory can help him. Some of the greatest gains are made by students who are good readers when compared to the class average. In six weeks a student should strive to increase his reading rate 60 per cent without loss of comprehension. Some students have increased their reading ability more than 60 per cent." (Witness the twenty-eight volunteers mentioned earlier who made a 95 per cent improvemen.)

However, Dr. Miller adds, slow reading may be only one of the causes of poor achievement. Special study on improving reading habits is recommended for those few readers who read rapidly but fail to achieve effective comprehension of what they read. These studies are available to the student through the Air University Library.

In many cases comprehension increases with the increase in reading speed. The explanation of this seems to be that greater concentration is required for fast reading and there is no opportunity for the mind to wander. In other words the slow reader whose mind wanders may be thinking faster than he can read. When his reading speed catches up with his thought processes, his comprehension levels off on a higher plane.

The Air University authorities feel that the laboratory has proved its worth during the school year while it has been maintained on a voluntary basis. So much so that it is planned for succeeding classes to include the six weeks course in the curriculum as a required subject.

The Air University has taken an idea from some of our most progressive civilian schools—the University of Chicago, New York University, Ohio State University and Peabody Teachers College, to name a few—and improved upon it to excellent advantage. The need for it is apparent, and the challenge is put to all our service schools.

REPLACEMENT SUPPORT in OCEAN THEATERS

Colonel C. G. Follansbee, *Field Artillery*
Instructor, Command and General Staff College

General

THE application of established personnel replacement principles in an oceanic theater of operations, where the campaign is characterized by successive amphibious operations from one island to the next, requires modification of procedures and policies applicable to a theater of operations on a continental land mass.

Replacement support of the field forces will usually be effected by the attachment of a replacement depot to an army, or of a replacement battalion to a separate corps.

The theater of operations will become deeper as the campaign progresses, and by far the greater part of the theater may have communications zone functions. Distances between the field forces and their logistical bases may increase to the point where days or weeks will be required for the forward movement of replacement personnel and supplies.

The many widely separated islands which will have been developed as air, ground, naval or logistical bases will each constitute a relatively compact command. But so numerous will they become as the campaign progresses that it will usually be impracticable for each to report to one and the same headquarters. The vast communications zone will doubtless be divided into base commands, each of which will have as its major subordinate elements the army garrison forces and services of its several island bases. In the Pacific Ocean Areas (Middle Pacific) during World War II there was no headquarters, communications zone, nor did the circumstances seem to require one. Each of the three base commands reported directly to theater headquarters.

Shipping

Water transportation is always at a premium and the zone of interior must arrange shipping schedules so as to make most economical use of the bottoms available for the movement of supplies, munitions and units essential to the operational plans. The movement of replacements must be fitted into these schedules. As a result, maladjustments of time, place and numbers in replacement deliveries are inevitable. These maladjustments could be eliminated only by having available enough shipping to earmark a sufficiently large proportion for the movement of replacements only. This will be impracticable in almost any far-flung modern war.

The zone of interior will desire to clear its depots and ports of any personnel earmarked for a particular theater as soon

Personnel replacement in ocean areas brings up problems not met with in other theaters. Increasing distances, a premium on shipping, and new administrative difficulties complicate the replacement system

as practicable. The theater will be equally anxious to secure the replacements. Consequently, the theater replacement officer must make the best arrangements he can with the zone of interior port authorities to ship the replacements on the earliest transportation which will debark the personnel at a point where they are needed. A nice balance of time and space factors, in itself not insoluble, is made more complex by the high priority necessarily accorded to critical cargoes.

Transshipping from a rear base to a forward base presents problems of the same nature. Personnel debarked at a rear base may have to be held for weeks before they can be moved forward to their ultimate destinations or to intermediate depots. This factor in itself imposes a great training responsibility upon the theater replacement command which must maintain the proficiency and morale of the replacements during the waiting period.

Even within a given base command, replacement depots may have to hold replacements for days or weeks until the base command concerned can arrange for shipping to move them to their several island destinations.

Distribution of Authorized Replacements

Obviously it is desirable to so distribute the replacements in the theater as to:

a. Hold the largest possible number of combat replacements at the most advanced base.

b. Carry on effective training.

c. Provide a suitable reserve to meet normal attrition in each area promptly, in spite of interruptions to shipping from the zone of interior and between depots.

d. Avoid holding unduly large proportions of the replacements at depots from which shipping to combat areas is irregular and infrequent.

e. Avoid risking the loss of large numbers of replacements by enemy action prior to their delivery to ultimate destinations.

f. Avoid locating replacement units at points from which they cannot be readily redeployed should it be necessary to change the direction of the axis of operational advance.

g. Minimize delays in forwarding and assignment of both combat and service replacements by reducing the necessity of transshipment and by locating replacement supply as close to demand as possible.

Missions of Replacement Units

In a large ocean theater each replacement unit may be required to perform a variety of functions. It will usually be impracticable to maintain a complete array of port units, replacement units, hospital returnee units, limited assignment retraining units, combat training units, communications zone support depots and specialist depots in each area of the theater.

As a minimum requirement, one depot with an appropriate number of battalions will be designed to furnish the replacement support for each base command, and in addition perform all other replacement command missions within that base command. If the depot is located along the axis of communications to the combat areas, it will normally have the additional task of acting as a replacement depot and as such receive, hold, train, and transship replacement personnel to more advanced depots.

Location of Replacement Units

Island bases in ocean theaters cannot be selected solely on the basis of their geographical location. There must exist suitable harbors, and naval, air, surface, and submarine base facilities, adequate land area usable for training, servicing, and storage, air fields, water supply. A climate compatible with the health of the troops and affording all-year round reliability of facilities, and accessibility to shipping, must be considered.

For the same reasons, replacement depots cannot be set down in any regular pattern but must be placed as close as

possible to the center of the military populations of the areas they serve.

Personnel Requisitioning Channels

Under such conditions, it will usually be best to prescribe that the personnel requisitions of each base command be forwarded to the replacement unit located within and serving that base command, rather than to follow the normal procedure of forwarding communications zone requisitions through communications zone headquarters to the headquarters of the theater replacement command. After approval by base command headquarters action copies of requisitions should be sent to the supporting depot for filling in accordance with priorities established by the commanding general of the base command. Information copies may be sent to headquarters theater replacement command by air mail for use in planning the distribution of replacements with the theater and in order to analyze current qualitative needs.

Regiments, separate battalions, and companies and detachments on a particular island, submit unit personnel requisitions through command channels to the commander of the army garrison on the island, who may cause them to be consolidated and/or forwarded to the base command headquarters for approval. On a larger island base the several services on the island may report directly to the base command headquarters located on the same island, and have coordinate status with the smaller island garrisons. In this case, it may prove convenient to require the requisitions of all units of each service on the major island to be consolidated for forwarding to base command headquarters. However, it is usually desirable to locate the supporting replacement depot on the same island with the headquarters of the supported command, in which case the advantages of consolidated requisitions are less and the extra work involved of questionable value.

Personnel Returned to Duty from Theater Hospitals

As in continental theaters, the personnel returned to duty status from theater hospitals constitute an important source of replacement personnel.

Initially all combat area personnel requiring hospitalization will be evacuated promptly to appropriate hospitals in the nearest established base to the rear. By the time they are ready for return to their units, or for reassignment, their units may have moved a thousand miles forward or may be committed to a remote part of the theater in a subsidiary operation. As long as the combat area is an island or a group of islands the evacuation policy of the combat area will in any case provide for only brief hospitalization therein. The casualty rates and the character and capacities of the hospital facilities available in the theater may require evacuation from combat areas or advanced bases to hospitals in the most rearward portion of the theater. Moreover, the climate in one area or another of the theater may facilitate recovery from diseases of a climatic character.

Hospital returnees fully qualified to return to their former units in the combat area should be so returned if at all practicable to do so, not only because of their value as combat veterans, but also because of the moral effect upon their weaker comrades who might otherwise welcome a minor wound, injury, or illness that would insure their removal from the dangers and hardships of combat.

Hospital returnees not qualified for duty in the combat areas should be reassigned as promptly as possible consistent with any necessary retraining to duty within the base command where they were hospitalized. Such a policy avoids the prolongation of unproductive casual status, not to speak of the saving of precious shipping space.

Administration

It may be said that difficulties of administration and comunications increase in proportion to the square of the distances between headquarters. It is especially important in ocean theaters that the several base commands be made responsible for promptly notifying appropriate elements of the replacement command of changes in their location of requisitioning units. Normal distribution of this information through station lists and similar periodic media is frequently too late to be of value. Similarly, prompt notification of necessary reduction or cancellation of requisitions must be the responsibility of the base command headquarters. Direct communication between replacement depots and the commands they support must be authorized. Air courier, air mail and radio must be relied upon to bridge the vast distances in an ocean theater. Many reports normally submitted manually must be transmitted by radio channels which will consequently groan under the weight of the traffic. Special codes must be adopted to reduce the length of statistical reports pertaining to replacement availability and requirements. Requisitioning units must be promptly advised by air mail of assignments made to them by distant depots, and similar procedures must be followed in inter-depot transfers.

Control of Distribution of Replacements

Over-all control of replacement distribution is retained by the theater commander by allocations and priorities established periodically for the several base commands and for the field forces. The determination of these priorities requires close coordination and continuous study by G-1, G-3, G-4, AG and chiefs of theater services.

The theater replacement officer attempts to follow these allocations in arranging for appropriate debarkation ports for replacements arriving from the zone of interior. In his capacity as Commanding General, Theater Replacement Command, he attempts to direct inter-depot flow of replacements to correct mal-distribution and to conform to established allocations.

Readjustment of Strengths of Theater Commands

As the campaign progresses, some areas will build up while others will "roll-up." Readjustments in the strengths of these commands will be necessary. Units will be redeployed, inactivated, and new units activated. Overhead allotments will change. When individuals become surplus to one base command, they will have to be reassigned to meet requirements in other areas of the theater. In such case the surplus individuals should be transferred, attached unassigned, to the nearest unit of the theater replacement command for inter-depot transfer and subsequent assignment by other replacement depots as directed by the commanding general, theater replacement command.

Aug 1944

Success in modern war can come only through a carefully planned employment of balanced land, sea and air forces operating as a team.

General Omar N. Bradley

Piecemeal Employment *of the* 63d Infantry Division

Lieutenant Colonel Chester H. Anderson, *Field Artillery*

The following article is one of a selected number of monographs prepared by officers attending the 1946-1947 class of the Command and General Staff College.—The Editor.

THE basic large unit of combined arms is the infantry division. As a *unit*, it is self sufficient, both tactically and administratively. If the component small units are detached and moved, or employed in combat separately, many difficulties arise. If infantry regiments are separated from the division and moved, their administrative and logistical support becomes difficult due to the absence of the quartermaster, ordnance, and other service troops. If employed in combat, the provision of artillery, signal, engineer, and medical support becomes a problem. If the supporting arms and services are provided from non-divisional sources, they must of necessity be withdrawn from their normal tasks, thus reducing essential support elsewhere. In addition, the support furnished can seldom approach that provided by the division's arms and services with whom the regiment trained. Standing Operating Procedures are new, different, or non-existent. *Esprit de Corps* is absent. Units may be attached to make up a team, but *teamwork* cannot be attained by orders.

In spite of these difficulties, military necessity may dictate the piecemeal employment of a unit, as happened in the fall of 1944, when nine infantry regiments were detached from three divisions, sent to the European Theater of Operations, and employed in combat for approximately six weeks prior to the arrival of the balance of the divisions.

The employment of the regiments of the 63d Division varied from the attachment of the battalions of one regiment to another regiment on the line, and the attachment of a regiment to other divisions on the line, to the formation of an independent division size task force. To complete the picture, regiments of the 42d and 70th Divisions were employed by attaching three extra regiments to a division on the line.

Background

As background for complete understanding, some of the factors which probably led to the War Department decision to commit the divisions piecemeal will be mentioned first, as well as the state of training of the units involved.

The army replacement system used in World War II was designed to keep all

Piecemeal employment of units of the 63d Infantry Division in France brought forth problems of morale, supply, and administration which were not experienced later with its own supporting arms and services

divisions at full fighting strength. However, varying terrain, weather, enemy, and many other factors make exact forecasting of combat losses impossible. Due to inaccurate estimates, coupled with an over-all shortage of men physically fit for infantry combat as we approached the bottom of our manpower barrel, a serious shortage of infantry replacements developed by spring 1944. Some 90,000 trained infantrymen were stripped from divisions training in the United States and sent overseas as individual replacements.

In spite of this, infantrymen were still critically short in the ETO by fall 1944. Sufficient replacements might be made available by mid-winter, but they were needed immediately. Reluctant to disband divisions on which a full year of training time had been spent, to secure individual infantrymen who could be trained in seventeen weeks, the War Department decided to detach regiments from the divisions and ship regiments overseas as units. Overseas commanders could bolster the infantry strength of their divisions by attaching complete regiments or battalions to understrength divisions and regiments in combat. If the situation permitted, the rest of the division could be brought overseas later, and the unit re-united. It seems probable that shipping was not available to move the entire divisions overseas, nor to provide the extra logistical support that the balance of the divisions would require.

The 63d, 42d, and 70th Infantry Divisions were among the last to be activated, in the spring of 1943. In spite of having been stripped of infantry in the spring of 1944 to provide individual replacements, fillers had been procured from various sources. By employing abbreviated, intensified training programs, the divisions were nearing completion of training by the fall of 1944. Early in October 1944, the 63d Division had successfully completed all AGF tests and was in the field on the first series of division exercises when the "alert for overseas movement" was received, with a readiness date of about 1 November. It should be emphasized that the "big picture" and high level decisions previously discussed were wholly unknown to us, and that the alert was for the division.

Movement Orders

Shortly before the readiness date, with packing and crating practically complete, the movement order was changed, so that only the three infantry regiments would move, accompanied by a very small headquarters detachment. No reason or explanation was given. Having been stripped of infantrymen once, the natural assumption was that this was the same thing, in a slightly different form. Older officers recalled that in 1918 entire divisions had been disbanded upon arrival in France, to provide replacements. Morale and *esprit de corps* had been exceptionally high due to the emphasis given during training. The likelihood of either disbandment or having to go through training a third time was a serious blow to that morale, so carefully brought to a peak.

The headquarters detachment to accompany the three regiments consisted of the Assistant Division Commander, G-1, G-2, G-3, G-4, AG, three Division Liaison Officers, the Division Engineer, the Division Signal Officer, the Division Quartermaster, the Division Ordnance Officer, the Division Artillery Executive, S-2, S-3, and a Red Cross Representative. Thirty-three enlisted men accompanied these seventeen officers, making a total of fifty officers and men in the detachment.

This headquarters detachment comprised the *entire* shipment accompanying the three regiments. Although the supporting arms and services were completely missing, the movement was made with minimum essential equipment, and no great difficulty was experienced until arrival at Marseilles. The unloading and segregating of supplies and equipment brought along, and the drawing and servicing of the organiza-

tional arms, transportation and equipment proved to be a very difficult task without the assistance of any ordnance, quartermaster, signal, or engineer troops. While the New York port had been able to furnish any assistance needed, Delta Base Section at Marseilles was unable to provide any assistance.

Join Seventh Army

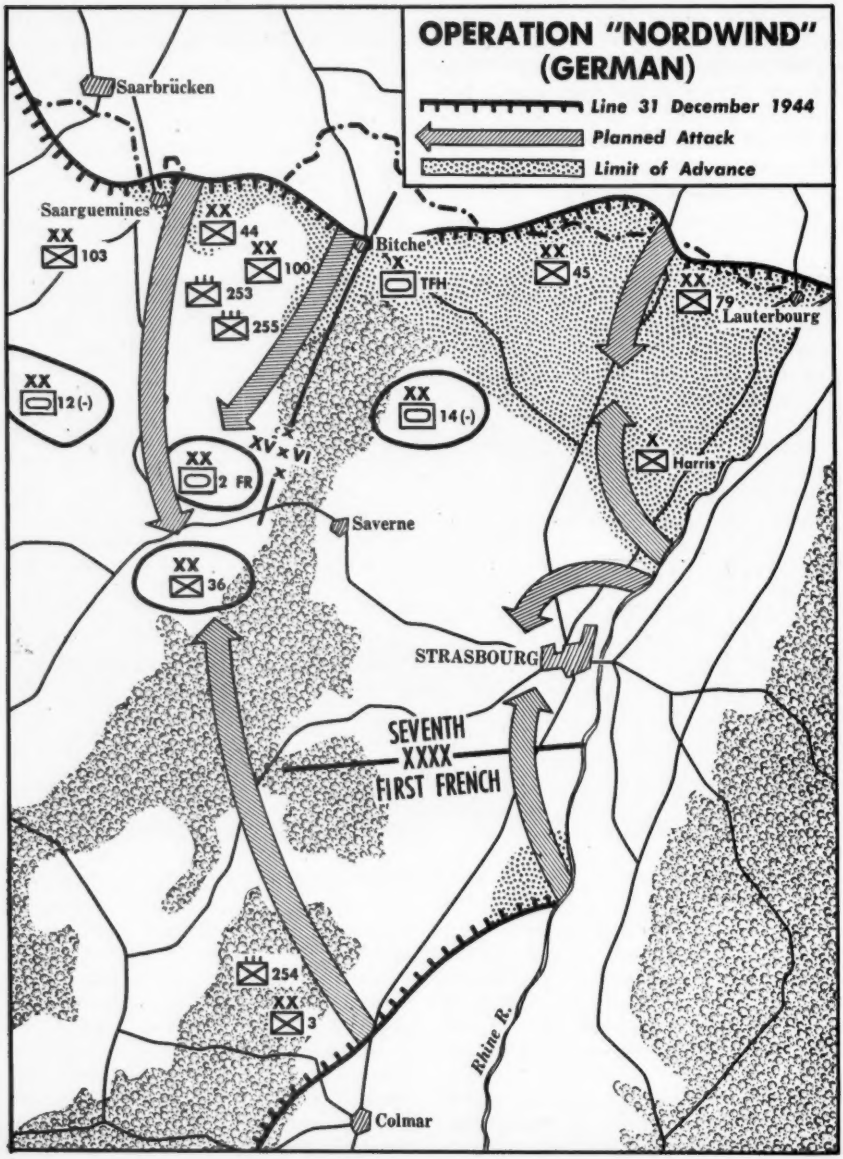
Difficulties were not allowed to delay the movement, however, for after landing on 9 December 1944, an advance detachment departed for Headquarters, Seventh Army, on 11 December, arriving there 12 December. Troops were to move by rail and organic motors, beginning 15 December.

Upon arrival at Headquarters, Seventh Army, at Saverne, France, we were pleasantly surprised to find someone both willing and able to orient us on the situation and plans. We were informed that the rest of the division would definitely join us within two months, and that in the meantime the regiments would spend most of their time in further training under our headquarters detachment, and with the assistance of special army training teams. We would be placed near the Rhine river flank, probably outposting the river with one regiment, while training two.



American soldiers guarding a breach in the Siegfried Line.—Army Signal Corps photo.

Prior to the closing of the troops in Seventh Army area, the Ardennes counteroffensive dictated a change in plans. At this time, Sixth Army Group forces were disposed on a front of approximately 200 miles. First French Army on the south held a front of some sixty miles from Basel, Switzerland, to just south of Stras-


OPERATION "NORDWIND"
(GERMAN)
Line 31 December 1944
Planned Attack
Limit of Advance
Saarbrücken
Saarguemines
XX 103
XX 44
XX 100
253
255
Bitche
X TFH
XX 45
XX 79
Lauterbourg
XX 12 (-)
XX 14 (-)
XV x VI
XX 2 FR
X Harris
Saverne
XX 36
STRASBOURG
SEVENTH
XXXX
FIRST FRENCH
254
XX 3
Rhine R.
Colmar

bourg, and were closed up to the Rhine except for a German pocket in the vicinity of Colmar, where the German Nineteenth Army held, and seemed to be reinforcing. U.S. Seventh Army was disposed on the left of the army group sector, with a flank on the Rhine extending forty miles north to Lauterbourg, thence eighty-four miles west, generally along the German border. The extended front was the result of Seventh Army's taking over part of Third Army's front, releasing them for employment in the Ardennes. Since it was considered probable that most mobile German forces had been sent north to participate in the Ardennes battle, the infantry regiments were considered sufficient protection along the forty mile Rhine flank, so Task Force Harris, as the headquarters detachment and three infantry regiments were named, was given the northern third of this flank. At the same time Task Forces Herren and Linden, similar units from the 42d and 70th Divisions took over the other two-thirds of the flank. Training was to be emphasized.

On 24 December, Seventh Army received a warning from Sixth Army Group that "Excellent agent sources report enemy units building up in the Black Forest area for offensive. Other indications for imminent enemy aggressive action exist. Imperative that all defensive precautions be immediately effective." The altered tactical situation had already been presented to the Army Commander by his G-2, and as a result, Task Force Harris was reinforced with the following attachments: 74th Signal Company (Special) less detachment; 533d AAA AW Battalion (— Battery A); Battery C, 431st AAA AW Battalion; 131st (105-mm How) and 155th (155-mm How) Field Artillery Battalions; 69th Armd Field Artillery Battalion; one Medium Tank Company; and one Tank Destroyer Company (with one platoon Reconnaissance Company attached).

Charged with a division size job, our "make-shift" organization now really began showing deficiencies. We had no quartermaster, ordnance, military police, or medical units, either organic or attached. Our division artillery executive became Chief of Staff for the task force, leaving the S-3, the S-2 and six enlisted men as the entire headquarters and headquarters battery, charged with employment of three battalions of artillery, actually being only six 105-mm howitzers short of the normal organic division artillery. From the composition of the headquarters detachment previously listed, it is obvious that the division general and special staff sections were equally undermanned. Although the artillery battalions given us were good, combat experienced organizations, their SOP's were different from each other, and from ours. The T/O of the Separate Armored Field Artillery Battalion and the Medium Battalion did not include the necessary number of liaison officers and forward observers, although all battalions had to assume direct support missions due to the width of front. Teamwork, so carefully rehearsed with our organic battalions, obviously had remained back in the United States with those battalions. Fortunately the Task Force was dissolved before meeting serious combat.

Estimate of Enemy

On 29 December, G-2, Seventh Army, estimated the most likely enemy capability to be not an attack against the Rhine flank, but that of "attacking south from the area: Bitche—Saarguemines, with five to eight divisions to seize the Saverne and Ingwiller passes, to fan out and destroy Seventh Army in the Rhine valley and to recapture Alsace." Such a drive might well be coordinated with a drive north from the Colmar bridgehead. Subsequent events and captured documents established that this estimate was remarkably close to the German operation *Nordwind* ordered by Hitler to commence at 2300, 31 December.

In order to meet the threat, Seventh Army withdrew Task Force Harris from the Rhine flank, and attached the 254th Infantry to the 3d Division at Colmar. The balance of the Task Force, less attachments, was attached to XV Corps, which in turn attached the 255th Infantry to the 100th Division and the 253d Infantry plus our headquarters detachment to the 44th Division.

Initially, the 3d Division attached battalions of the 254th Infantry to each of their regiments, but this was for the purpose of battle indoctrination, since it is obvious that such employment leaves the regimental headquarters and headquarters company with nothing to do, and poses a problem as to employment of the regimental service, cannon and antitank companies. In addition, an unknown element is interjected into all three of the divisions' organic regiments, while the regimental training of the attached regiment is abandoned. For the most part, the 3d, 44th, and 100th Divisions all employed the attached regiment as a unit, and results were very satisfactory. The 254th Infantry received the Presidential Unit Citation for its operations, while both the 253d and 255th Infantry are mentioned favorably in Seventh Army reports on the repulse of the German New Year's attack.

It should be pointed out that these operations were in the nature of defense, counterattack, and limited objective attack. In such situations, the divisions had no difficulty in supporting the Fourth regiment with their organic signal, engineer, ordnance, quartermaster, and medical units. In a moving situation, this would undoubtedly not be true.



Headquarters, Seventh Army, Saverne, France, where the advance elements of the 63d Division reported, December 1944.—Army Signal Corps photo.

The six infantry regiments of Task Forces Herren and Linden (42d and 70th Divisions) were attached to VI Corps during this period, and since VI Corps had only two infantry divisions, the same method of employment could not be used. On occasion the Task Forces were rein-

forced and employed as an independent division size unit as has been described for Task Force Harris. At other times three regiments were attached to both the 45th and 79th Divisions. Neither method proved satisfactory. Obviously no division can support or employ six regiments efficiently. Likewise, the difficulties we experienced as an independent reinforced task force of division size, proved serious when the action became heavy.

During this phase, our headquarters detachment was integrated into corresponding staff sections of the 44th Division, providing extremely valuable experience for us, and worthwhile relief and assistance to them.

On 1 February 1945, the remainder of the division began closing in the area, and on 6 February, the division assumed command of a sector near Saarguemines, France. It went on to make an excellent combat record, proving to our satisfaction that the difficulties experienced as a Task Force were chargeable to the make-shift nature of the organization, and not to the character or training of our troops. Among its achievements, the Division holds the honor of being the first division in Seventh Army to penetrate completely the Siegfried line, while fighting alongside the Veteran 3d, 36th, and 45th Divisions.

Lessons

Some of the lessons learned from the operation are:

1. Infantry regiments, separated from the normal supporting arms and services of their parent division, will generally experience great difficulty in their supply and maintenance.

2. Task forces organized from units which have had no training together, are likely to be ineffective fighting teams.

3. In reasonably static situations, the most effective method of employment of a separate infantry regiment is to attach it to a division. The supporting arms and services of the division can support a fourth regiment in such situations without undue strain.

4. A division cannot effectively support and employ more than one extra regiment except under most unusual circumstances.

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aug 1948

America's strategic position in the world today is an outgrowth of her wartime strength. In both Europe and Asia, political boundaries have been drawn on the lines where armies met in defeat of the Axis. If we are to keep our positions, we must maintain our strength.

General Omar N. Bradley

CONCENTRATION OF FORCE

Lieutenant Colonel M. A. Solomon, *Field Artillery*
Instructor, Command and General Staff College

THROUGHOUT recorded history decisive victories on the battlefield have been preceded by great concentrations of force. Alexander, Napoleon, Grant, Lee and many other outstanding commanders appreciated this fact. They realized that the application of the principle of mass was one of the keys to a successful campaign.

In World War II the concentration of force again was proved essential to operational success. In fact, the assembly of the allied forces in England, with the subsequent employment of this power on the beaches of France, was the greatest massing of military might that the world has ever known. The invasion of the continent that followed that massing of troops certainly should be placed among the decisive battles of all time.

Field Marshal Bernard L. Montgomery, while discussing the principle of mass with his staff, gave the following advice: "The commander must foresee his battle. He must decide, before the battle starts, how he wants the operations to be developed. He must then use the military effort at his disposal to force the battle to swing the way he wants it. A sure way to victory is to concentrate great force at the selected place at the right time."

Numerous other historical expressions could be quoted to support the importance of the power available to the commander who properly concentrates his force. Yet, in the text books, very little can be found on this subject. One may logically ask why this is true if the operation is so vital. The answer lies in the fact that in the concentration there is much to be done and little to be said.

By definition, the concentration of force is the movement and assembly of men, equipment, and supplies into an area from which it is intended that further action should begin. Usually the subsequent operation is an attack. This massing of power envisages not only the assembly of men but also of airplanes, ships, artillery, engineering equipment, signal devices, chemicals and all other implements of warfare available. The concentration of force begins with the movement and assembly of the men, equipment and supplies. It ends when the concentrated mass begins the offensive at the selected place and time in accordance with the operational plan.

There are seven major considerations in a successful concentration. They are: scheme of maneuver, flexibility, secrecy, security, rate of concentration, sequence of movement, and control of the movement. Some of these governing factors appear to be more important than others. Each must receive careful consideration, however, if the operation is to be entirely successful.

Scheme of Maneuver

The first and most important factor for consideration in the concentration is the scheme of maneuver for the ensu-

ing operation. It is upon this contemplated plan of action that the entire operation is based. Once the scheme of maneuver is determined, backward planning is initiated. The mass is then concentrated so as to facilitate the execution of the subsequent operation.

The breakthrough at St. Lo, known as Operation "Cobra," is an excellent example of the determination of the scheme of maneuver prior to the concentration. Here General Omar N. Bradley realized that a continuation of the war in the hedgerows would be costly in casualties and supplies as well as time consuming. In order to overcome this condition, he concentrated his force at the place he desired. Then, at a time of his own choosing, and in accordance with a definite scheme of maneuver, he attacked.

Many times, however, the exact scheme of maneuver cannot be predetermined. When this is true, the commander announces to his staff, for planning purposes, the known or assumed controlling factors. The concentration then proceeds just as though a definite scheme of maneuver were known.

Decisive victories on the battlefield in the past have been preceded by great concentrations of force. In the future, the problems and the power of the concentration will assume even greater importance

Flexibility

The second governing consideration for a successful concentration is flexibility. The command must be flexible during the movement to the concentration area. It must be ready to meet any probable contingency while in the area. It must begin the battle in a flexible formation.

There are several ways in which flexibility may be attained. First, intelligence should be carefully scrutinized. Based upon this intelligence, formations are adopted to cope with the enemy's capabilities. Alternate plans are prepared to include rerouting of motor columns and trains. Troops in assembly areas should be placed in flexible formations with corps and divisions in column or echelon. It may be necessary to make the entire formation into an island of resistance.

Secrecy

There is no military operation in which the consideration of secrecy can be omitted. This is especially true in the concentration of force. If the enemy learns of the concentration it follows that the subsequent scheme of maneuver may be determined. Thus the entire purpose of the operation may be lost. Some of the ways in which secrecy may be achieved are night or infiltration movements, concealment of troops in bivouac, and maintenance of radio silence. Local air superiority is highly desirable. Counterintelligence measures are given serious consideration.

During World War II, in the European Theater of Operations as well as in the Pacific, secrecy played a prominent role in the concentration of forces. Due to the secrecy measures of the Allies, the Germans were unable to ascertain correctly the landing area for the main invasion. As a result, they held approximately fifteen divisions in the Pas de Calais area of France waiting for the principal effort. The American invasion of Leyte was clothed in secrecy to the extent that complete tactical surprise was achieved.

Security

Security in the concentration means the protection of the command. The best protective measure, perhaps, is secrecy. It must be assumed, however, that the enemy cannot be completely blinded to the fact

that large bodies of troops and quantities of materials are being assembled. Positive action, therefore, must be taken to protect the concentration. A failure to do so may disrupt the commander's contemplated plan of action.

Security must be considered from the viewpoint of both ground and air. Light, mobile security units are excellent organizations for screening and securing the concentration as a whole. Each unit in the concentration, however, assumes the responsibility for local security in the area upon its arrival. Antiaircraft protection is a prime requisite not only in the concentration area but also along the lines of communications.

Rate of Concentration

The speed with which the force is assembled greatly influences the success of the operation. The enemy will probably learn of the concentration at some time prior to completion. If the speed of the assembly is rapid, however, the force will be striking before the enemy can retaliate. The rate of concentration, therefore, must be faster than the enemy's capability to counter. Thus the concentration may gain the important advantage of time. But, while time is the essence, it must not be gained at the expense of initially having the units improperly placed in the concentration area. Any such faulty grouping may require a shifting in location of arrived units and a loss of any time gained. The rate of concentration must be faster than the enemy's reaction. At the same time it must be smooth, without confusion, and never so hastily accomplished that a regrouping in the area is necessary.

Sequence of Movement

The sequence of movement goes hand in hand with the rate of concentration. Which troops must arrive in the area first? Where should each unit be located? What is available in the way of transportation? What supplies are in the area? Which classes of supplies must have priority over others? These are all command decisions. The commander must not lose sight of the logistical implications in the concentration of his force. The importance of the sequence of movement of the men and materials is one of the most serious considerations in a successful and efficient concentration.

Movement Control

The movement of troops and supplies to the concentration area is a problem of transportation. It is one that is complicated by the fact that, in the existing battle, logistical requirements are probably demanding full use of the highways, railroads and skies. It follows, therefore, that to impose further traffic on strained facilities there must be rigid control. Even though plans are made with utmost care and accuracy, unforeseen circumstances may arise. It is the responsibility of the commander to employ every element of his command to insure that the movement is efficiently conducted. Every available staff officer can well be utilized to check critical points during the movement.

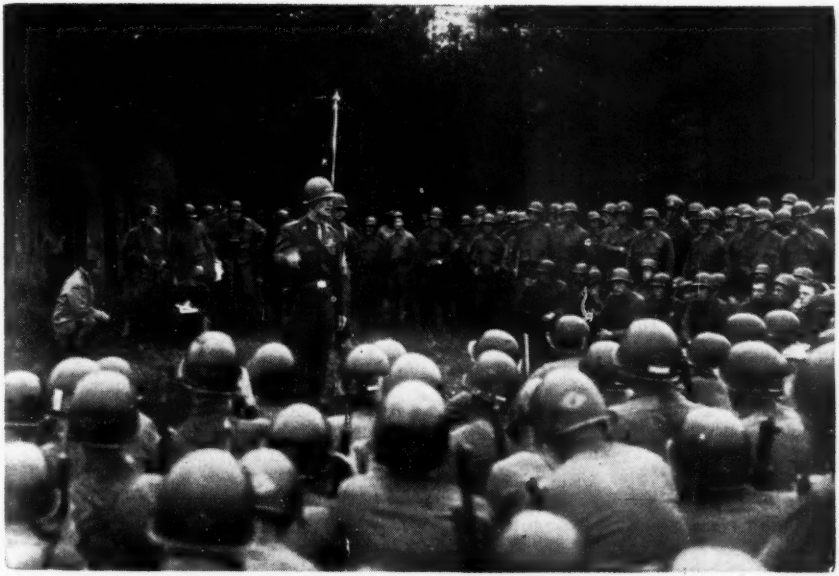
Ninth Army an Example

The military history of the United States contains many examples of successful concentrations. They range from the operations of General George Washington in the Revolution to those in World War II. In fact, the first battle of Bull Run was won by the superior ability of the Southerners to concentrate their forces. In this same battle, as a matter of interest, railroads were used for the first time in this type of operation.

During World War II, however, one of the best examples illustrating the principle of concentration is the assembly of the Ninth United States Army on the continent in the fall of 1944. An examination of this operation will bring out not only the intricacies of the concentration but will prove the soundness of the seven basic considerations enumerated above.

When Ninth Army arrived on the conti-

nent in August 1944, General William H. Simpson received a letter of instructions from Twelfth Army Group which gave him operational control of VIII Corps, consisting of the 2d, 8th, 29th, and 83d Infantry Divisions, and the 6th Armored Division. His first combat mission was to reduce the Fortress of Brest, contain the enemy at Lorient and St. Nazaire, and protect the south flank of the army group. This, in itself, was a fair assignment for an army headquarters that was yet to experience combat. But additional missions were soon to be received.



Lieutenant General William H. Simpson addressing troops of Ninth Army during concentration.—Army Signal Corps photo.

First there were three corps to receive and prepare for combat. In addition, the 26th, 44th, 94th, 95th, 102d, and 104th Infantry Divisions were en route to the continent and had to be received, equipped and given some additional combat instruction. Also the 9th and 10th Armored Divisions were soon to arrive. Ninth Army, therefore, was faced with two operational missions, the concentration of arriving units and the defeat of the enemy in western France.

Brest surrendered on 19 September. VIII Corps, with the 2d and 8th Infantry Divisions, was then ordered east to the Third Army Zone for contemplated action in that area under Ninth Army. This action was based on orders contained in a Twelfth Army Group Letter of Instructions that Ninth Army was to operate in a continuation of the offensive eastward between First and Third Armies.

It was at this point that Ninth Army's concentration of force for action on the main front began. Heretofore the operation had been one of concentration of

troops. Accordingly, in order to control VIII Corps, a forward echelon of Ninth Army Headquarters opened at Arlon, Belgium. At the end of September, the Army was continuing to assemble its Corps and Divisions in Normandy and Brittany, while 500 miles away a forward command post was concentrating the force of Ninth Army against the enemy. At this time units being concentrated were III, XIII, XVI, and XXI Corps; 44th, 84th, 95th, 99th, 102d, 104th Infantry Divisions; and the 9th, 10th, 11th, and 12th Armored Divisions.

During October, Ninth Army plans had to be quite flexible. First of all came a change of mission whereby the Army was to operate on the left or north flank of Twelfth Army Group. This necessitated a move of the forward command post from Arlon to Maastricht, Holland, some seventy-five miles to the north. VIII Corps was then assigned to First Army while XIX Corps being the northernmost corps of Twelfth Army Group, was given to Ninth Army.

This change of mission created many problems. In addition to the physical movement of the Army Command Post, there were other army and corps supporting units involved. In order to prevent the lateral movement of so many troops, a trade of like organizations, including supplies, was accomplished. On 22 October the shift was completed and XIX Corps, 29th and 30th Infantry Divisions, 2d Armored Division and 113th Cavalry Group came under the command of Ninth Army.

As early as 13 October, however, the change of the operational mission of the Ninth Army to the north enabled the troops coming up from France to be diverted to the Maastricht area. XIII Corps began movement to that sector on 15 October and its arrival gave General Simpson a corps to aid in the reception of new divisions.

In the meantime, back in France, corps and divisions were still being received, equipped and trained by Ninth Army Rear. III Corps accomplished the bulk of this arduous task until it was relieved on 11 October by XVI Corps.

Air cooperation was vital in the protection of the newly arrived Ninth Army. Accordingly, XIX Tactical Air Command was given a cooperative mission with the Army on 3 October at Arlon. This was in accordance with the best principles of early air-ground cooperation in concentration of force.

Ninth Army closed its command post at Arlon and opened at Maastricht at 1200A 22 October. Shortly thereafter the Army rear echelon moved up from Mi Foret.

In less than two months Ninth Army had cleared the Brittany Peninsula, moved five divisions to the Eastern Front, concentrated and placed one corps in the line between two armies, been relieved of this corps in place and assumed command of another corps one hundred miles away. The move to Arlon from Mi Foret of the army forward echelon and the VIII Corps alone consisted of a logistical problem involving 80,000 troops, 7,000 vehicles and 75,000 tons of supplies.

Concentration in Future Warfare

Now that the concentration of force has been analyzed as practiced by successful commanders in our history, what is the future of this important military operation? Will it be practiced in wars to come? The answers to these questions lie in the concept of future warfare.

Many military thinkers predict that World War III will be fought in three dimensions; that the air phase will dwarf that of the land and sea. To some, the use of the atom bomb envisages an elimination of the concentration entirely. Air drops of armies, corps and divisions at strategic spots in enemy territory are visualized as within the realm of practicability.

Regardless of the predictions as to the manner of future warfare, the basic concept of the principle of mass remains unchanged. Even though the concentration area may be a place in the skies marked by longitude and latitude, the seven basic governing factors still apply. There will be a subsequent scheme of maneuver. Flexibility, secrecy and security will assume new importance. The rate of concentration will have to be geared to greater speeds in order to avoid the counteractions of an alert enemy. The sequence and method of movement will require extreme logistical accuracy. Obviously, rigid control of the movement will be necessary. It appears, then, that the problems and the power of the concentration in future warfare will assume greater importance than ever before.

Were I permitted to give but one word of advice toward the safeguard of the national interest, I should elect to urge that we reaffirm the basic concepts which safely guided our past, and above all else regain some of Lincoln's faith in the wisdom of the people.

General of the Army Douglas MacArthur

Some sources take comfort in the fact that we may call on the veterans of World War II in an emergency. We generals are sometimes charged with proposing to fight the next war with weapons of the last, generally by persons unwilling to give us the means with which to develop new ones. But certainly we have never been sufficiently callous to propose fighting a future war with the men of the last. For men become rusty, no less than weapons, and weapons, new or old, are worthless without the men to man them.

General Jacob L. Devers

Engineer Combat Group *in the* Rhine River Crossing

Lieutenant Colonel John C. Dalrymple, *Corps of Engineers*

The following article is one of a selected number of monographs prepared by officers attending the 1946-1947 class of the Command and General Staff College.—The Editor.

Introduction

AFTER the Normandy invasion in June 1944, and when the Allied Armies had begun their advance toward the heart of Germany, the greatest single natural obstacle they faced was the Rhine River.

The Rhine is one of the world's great rivers. It starts in Switzerland, where it is fed by the melting snows of the Alps, and flows into Lake Constance on the German-Swiss border. From there it flows westward along the German-Swiss boundary for approximately one hundred miles to Basel where it turns north and is the frontier between France and Germany for another one hundred miles as far as Karlsruhe. From this point the Rhine is entirely within western Germany for a distance of three hundred odd miles until it reaches the German-Netherlands border at Emmerich. Across the border, in the Netherlands, it divides into two channels and flows into the North Sea.

Formidable Obstacle

There was no way for the Allied Armies to advance far into Germany without crossing the Rhine. Throughout the four hundred and twenty miles between the Swiss border and the Netherlands frontier, the Rhine River is a formidable obstacle. It varies in width from 700 to 2,000 feet and is nowhere fordable. High water generally occurs in the winter due to heavy rains and again in the summer due to the melting of ice and snow in the Alps. Flooding, however, has been known to happen at all seasons of the year, and any bridging plan must anticipate such an event.

The German military command was well aware of the value of the Rhine as a military obstacle and was prepared to take full advantage of it. It was believed that crossing and bridging operations by the Allies would be very difficult and very costly. In addition to those characteristics which make the Rhine a formidable natural obstacle, the river valley was heavily fortified. It was expected that the Germans would have destroyed all existing bridges and would make a determined effort to defend the river line with every means at their disposal, for this obstacle seemed to offer the best, and perhaps the last opportunity for stopping the advance of the Allies.

In view of the above considerations, the crossing of the Rhine and the establishing of bridgeheads on the opposite bank were looked upon as a major operation, second in magnitude and importance only to the crossing of the English Channel and the landing on the beaches of Normandy.

The plans for the U.S. Army Rhine crossing were carefully prepared. Much thought and study, by all concerned, were devoted to the methods and equipment needed to make the crossing a success. Detailed and comprehensive reports on the

hydrography of the Rhine were compiled and used as a basis for planning. Numerous lengthy conferences were held with naval and engineering experts of both Britain and the United States in attendance, and a completely free interchange of ideas occurred. By virtue of such meetings, the over-all plans were gradually developed and became more firmly established.

Plans

In general, the plans called for the U.S. Armies to cross on a broad front after the western bank of the Rhine had been seized in its entirety. The Ninth U.S. Army on the north and the First U.S. Army on the south were to complete a double envelopment of the strategically important Ruhr industrial area linking up to the east of the Ruhr in the vicinity of Paderborn. Plans outlined the normal sequence of river crossing operations:

First, cross assault troops by storm boats and double assault boats with motors.

Second, construct and operate rafts and ferries.

Third, construct assault bridges.

Fourth, construct Bailey bridges.

Fifth, build permanent type pile highway bridges.

Sixth, build railway bridges.

Those phases involving the planning, preparation, and the construction of the assault bridges and the Bailey bridge are the ones with which the Engineers were chiefly concerned.

Geographical Features

The Rhine valley in the vicinity of Wesel, Germany, is a low, level plain, lightly wooded and studded with small villages. The valley is primarily agricultural. Cover and concealment are generally limited to that provided by the scattered patches of woods, buildings, and dikes along the river. Fort Blucher and the small fort to the northwest offer additional cover but the area is generally dominated by the buildings still standing in Wesel.

The town of Wesel (pre-war population of 25,000) lies at the junction of the Lippe and Rhine Rivers. Wesel is a highway and rail center, and for that reason was chosen as the center for this operation involving such a large number of bridges in a relatively small area. On the west bank the only major approach road to Wesel is the Venlo-Geldern-Wesel highway, an excellent, two-way macadam road. This road figures prominently in the operation as will be seen later. On the east bank the major exit road is the highway to Haltern and on to Münster. It was similar to the road just described.

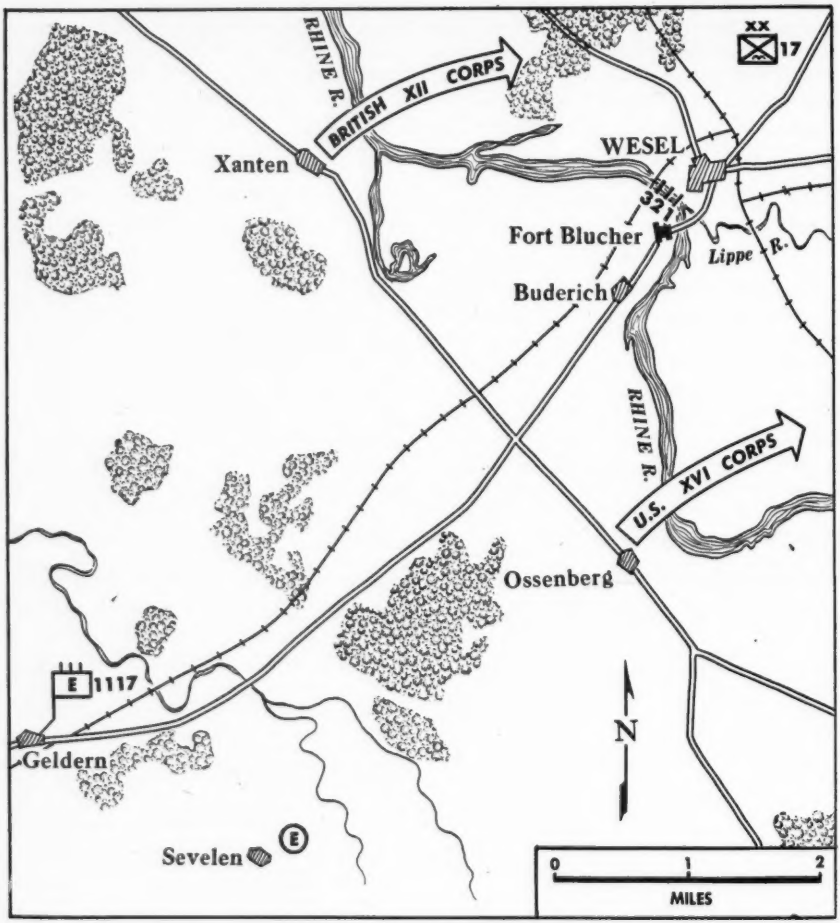
The Rhine River was a formidable obstacle to cross, but the 1117th Engineer Combat Group made its task easier by detailed planning, training, adherence to doctrine, and centralized control of traffic

Cross-country trafficability in this sector is poor. The surface is soft alluvial clay and sand, permitting traffic only during long dry periods. In wet weather the soil fails in flotation under continuous traffic.

The Rhine itself at this point averages 1,150 feet in width with a maximum depth of twenty-eight feet. The maximum stream velocity at the time of crossing was five miles per hour, and considerably less than that near the banks. The west bank of the river is low, and in order to restrain summer floods there are extensive earthen dikes. Inshore of the summer dikes, and also earthen, are winter dikes to prevent floods in the winter-time.

Assignment of Missions

On 25 February 1945, the Commanding Officer, 1117th Engineer Combat Group,



returned to his command post at Nuth, Holland, from an engineer conference at Ninth Army Headquarters at Maastricht, Holland. At this conference the mission of constructing three floating bridges across the Rhine River at Wesel, Germany, had been assigned the group. Initially, two treadway bridges and one Bailey bridge were to be built; this was later changed to one treadway, one heavy pontoon, and one Bailey Bridge.

Also at this meeting, the commanding officers of the three engineer groups that were to construct bridges in the Ninth Army zone were requested to make a study of their needs for the operation in material,

equipment, and troops. These requirements were to be presented at another conference a week later.

The commanding officer, 1117th Engineer Combat Group, gave his staff the details of the Army plan and set a deadline of six days for a tentative plan to be formulated by his staff. The troop requirement as estimated by the staff was: four engineer combat battalions; one heavy ponton battalion; one light ponton company; one light equipment company; one treadway bridge company; and three dump truck companies, an over-all force of about 4,500 engineer troops. This troop list was approved with the exception of the number of dump truck companies which was reduced to one. Shortage of such troops in the theater necessitated this action.

The three bridges to be constructed by this group were of different types, thus imposing an additional equipment and material problem. A safety factor of 50 per cent was used in requisitioning bridging materials and other engineer equipment for this task. That figure of 50 per cent was in accordance with the over-all Army plan, but it later became necessary to reduce the factor to 25 per cent, because of the serious losses in like equipment suffered in the Roer River crossings. Large quantities of materials for booms, road building, etc., were also requisitioned.

At this time, the Army engineer dump was located in Maastricht, Holland, about 70 miles from Wesel, Germany. It was therefore requested that a group engineer dump be authorized in the vicinity of Sevelen, about fourteen miles from the bridge sites. This request was approved and concentration of the equipment and material was begun.

It is not intended to go into the many details of the logistical problems involved in the movement of such large quantities of cumbersome engineer equipment and bridging material; the receipt and sorting of such to be certain that it could be readily located and outloaded without delaying the operation; nor its camouflaging to prevent enemy detection, which constituted some of the many problems imposed. Suffice it to say that these logistical problems, along with others which arose when the time came to begin the bridging, were by far the most difficult to overcome; and it was only because time was adequate that they were solved. This movement from the Army dump at Maastricht to the group dump at Sevelen required about three weeks due to the inadequacy of highways.

Unit Training

The troop list having been approved by the Army Engineer, units were promptly placed on an intensive training program for the part of the group mission they were to perform, as soon as they were attached. One combat battalion was to construct the treadway bridge, so the treadway bridge company was attached to that battalion and the battalion commander was made responsible for the job. These units were relieved of normal engineer missions and concentrated in an area where the personnel of the two units could work closely together to perfect the details of their task. Both the battalion and the company were veteran units and the training progressed smoothly. The heavy ponton battalion was also concentrated in a training site on the Meuse River where it could point its training toward the construction of the reinforced heavy ponton bridge which was its mission. This battalion also was made responsible for the erection of booms of all types; anti-mine, anti-personnel, and anti-submarine. Two engineer combat companies were attached to it.

Perhaps the most difficult of all tasks was that of a third combat battalion which was to construct the Bailey bridge. The Bailey bridge was developed by a British engineer. Originally it was designed for use as a fixed bridge, and as such was employed quite extensively in

Italy, particularly to bridge relatively short unsupported spans up to about 150 feet. For crossing wider streams, it was necessary to go to some sort of a float upon which to support the Bailey panels; this was done by using a heavy, cumbersome, yet effective triple boat affair. This was the particular type of bridge that this battalion was to build. A further complication in its construction was caused by the fact that the over-all Army plan envisaged the possibility that the early construction of pile bridges might be delayed, and, therefore, the Bailey bridge was to be put in to function as an all-weather bridge. It would be constructed starting on the summer dike with intermediate piers to the water's edge, then if floods should occur prior to the completion of the pile bridges, the Bailey would remain operational. All of the many details of construction singular to such a bridge were worked out in the training phase, and when the actual operation came about the task was considerably simplified.

In a like fashion, the various other tasks that make up such an operation as this were assigned early to the units of the group so that training and familiarization could begin without delay. By now the missions assigned the group and the breakdown of responsibility for each of the component tasks is shown below.

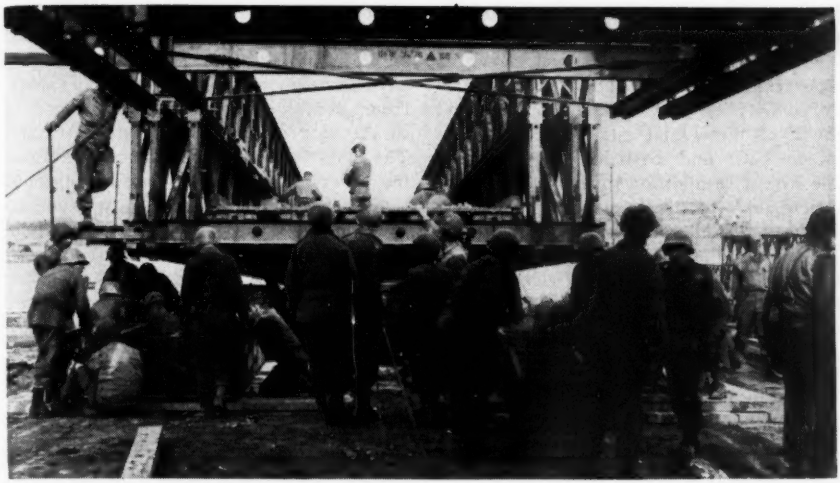
It can be seen readily that at least two of the basic principles of planning for a deliberate river crossing operation had been followed: the missions of the major elements had been clearly defined insofar as was possible at this time, and responsibility for each phase of the operation fixed; attachment to each major unit of subordinate units necessary to do the job was in accordance with early allocation of the means.

Target date for this operation was tentatively set for the last week in March and later established as 25 March. Prior to 18 March, reconnaissance of the sites was restricted to air, and the neighboring artillery units of XVI U.S. Corps provided liaison planes for this purpose. Small parties began ground reconnaissance beginning 21 March.

Tactical Plan

Ninth U.S. Army was still a part of British Twenty-first Army Group. The boundary between Ninth Army and British Second Army was the Venlo-Geldern-Wesel Highway which was to be the Main Supply Route for Ninth Army. In the Ninth Army Zone, two divisions in XVI Corps were to make the assault. Simul-

Mission	*Unit*	*Attachments*
Treadway Bridge Construction	248th Engineer Combat Battalion	1000th Treadway Company
Heavy Ponton Bridge Construction	551st Heavy Ponton Battalion	2 Companies 1253d Engineer Combat Battalion
Bailey Bridge Construction	167th Engineer Combat Battalion	536th Light Ponton Company
Construction of Approach and Exit Roads	1253d Engineer Combat Battalion (—)	574th Light Equipment Company 2705th Dump Truck Company
Operate Engineer Dump	Company 1698th Engineer Battalion	
Construct Booms	551st Heavy Ponton Battalion	Company 1698th Engineer Battalion



Above, troops of the 1117th Engineer Combat Group, moving a section of the first Bailey bridge across the Rhine River into position at Wesel, Germany. Below, ponton bridge built by the 1117th Group. Both pictures were taken on 26 March 1945.—Army Signal Corps photos.



taneously, the British were to force a crossing of the Rhine in the vicinity of Xanten and Rees. In what was known as Operation "Varsity," the U.S. 17th Airborne Division was to land just east and north of Wesel and establish contact between U.S. and British troops east of the Rhine. In addition to these large scale operations, British Commandos of the First Commando Brigade were to assault the Rhine immediately north of Wesel, attack south into the city and clear out all small arms and artillery observation posts from the bridge sites. Once the bridgehead was secured, the U.S. XIX Corps, spearheaded by the 2d Armored Division was to break out and head for Paderborn to effect a juncture with the 3d Armored Division attacking on the south side of the Ruhr industrial area.

The concentration of tactical troops in and around Wesel was great, and the build-up of all classes of supply prior to the operation imposed a terrific logistical problem. Movement was restricted on all highways, and traffic moved slowly. It would have been very desirable to have a bridge dump somewhat closer to the construction sites than one at Sevelen, but operational restrictions prevented this. Arrangements were made, however, to obtain priority on the Sevelen-Wesel highway for a period of twenty-four hours when the order to begin construction was given. It was hoped that during that period of twenty-four hours a great amount of the material could be moved into the target area.

Concentration

By 22 March all units of the group had completed rehearsal for the operation and had concentrated in the general vicinity of Geldern. The concentration of material and bridging equipage was also completed.

Two additional missions had been given the 1117th Engineer Combat Group a short time before; the first, the construction and operation of a Class 70 ferry, commonly called the 'Rhino'; the second, the clearing of the streets through the town of Wesel to link up to the north of the city with British engineers (working south from Rees), and the opening of routes to the east on the Wesel-Mumster road. The Class 70 ferry was to be used for crossing "Pershing" tanks. These additional tasks necessitated a change in missions to some of the units in the group with the 248th Engineer Combat Battalion being given the job of building the ferry after it completed the treadway bridge, and the 1698th Engineer Combat Battalion being given the mission of clearing Wesel.

Also, on 22 March, the establishing of liaison with the British right flank corps was effected. Liaison with U.S. XVIII Airborne Corps, operating under British Second Army, was effected at the same time. This close liaison was directed inasmuch as the British were to have running rights on the Wesel bridges for the first four days of their operation. Early notification of completion times on each bridge was to be given directly to the British Corps to insure maximum use of the crossings. At the same time, XVIII Corps Commander was quite anxious for this information, too, in order to push across the land-tail of the U.S. 17th Airborne Division.

Operation

At 1200, 25 March, orders were received to move to the sites and to begin construction. The 248th Engineers immediately started the movement of heavy trucks loaded with treadway material to a mobile bridge park in the village of Buderich, some two miles from the bridge sites. An advance party went on to the site and began preliminary work necessary to prepare for the construction of the bridge. Then, as the bridge trucks were needed they were called forward from the mobile park in Buderich by radio. Mine sweeping and road building crews moved in at the same time. At 1500, the actual construc-

tion of the bridge began. Mortar and occasional small-arms fire still fell in the area, and an enemy assault gun succeeded in destroying two loaded bridge trucks before a platoon of engineers crossed in assault boats to put it out of action.

Construction of the treadway bridge proceeded without incident and about 2000 the group liaison officer was dispatched to inform the British Corps Engineer that one bridge, Class 40, would be open for traffic at 0400 the following morning. This information was also given to the Corps Engineer of XVIII Airborne Corps. Ninth Army Headquarters was kept continually in touch with the progress by radio, telephone, and courier.

Meanwhile, as quickly as the bulk of the treadway equipment was moved up, the heavy ponton equipage was placed on the road and the heavy tractor-trailer loads of this cumbersome bridging was shuttled forward from the bridge dump at Sevelen to the bridge site. No attempt was made to begin construction at this time, as that of the treadway held first priority. The heavy ponton was unloaded instead at site number three, and trucks returned to carry additional bridging forward. Every effort was made to take full advantage of the twenty-four hour road priority in order to move the great bulk of material into the target area before the traffic became too heavy once the first bridge was open.

At 2000, 25 March, it was decided that proceeding with the construction of the heavy ponton bridge would not interfere with that of the treadway bridge, so the 551st Heavy Ponton Battalion was ordered to begin its task. From the beginning, it was evident that the long hours spent in training for this job were to pay in time saved.

While these two bridges, the treadway and the heavy ponton, were being built, roads were laid out and constructed by the 1253d Engineer Combat Battalion. The company of engineers that had gone across the river to clear out German snipers and the assault gun were now requesting more of their engineer tools so that they could go about the clearing of streets through Wesel. Bulldozers, air compressors, explosives, etc, were being ferried across to them.

Taking advantage of any breaks in the traffic, the 167th Engineer Combat Battalion now began the tremendous movement of the Bailey bridging forward. Load after load was infiltrated into the columns and the same procedure followed as for the heavy ponton, unloading at site number two, and returning to Sevelen for more equipage.

Admittedly, the concentration of so vast an amount of critical engineer bridging equipment in so small an area was to invite disaster if German air should be successful in an attack. It was a calculated risk that was taken and one that paid off. The AAA brigade had concentrated three gun battalions and five automatic weapons battalions in the Wesel area to furnish protection for these bridges.

By 0400 on the morning of 26 March, the treadway bridge was finished and units of AAA crossed to ring the bridgehead east of Wesel. Engineer vehicles and equipment needed in the city were next to cross, followed by those vehicles of the XVIII Airborne Corps. British vehicles did not begin to cross until 1200, because as later explained by the British Corps Engineer, there had been a misunderstanding as to the exact time the bridges were to be under British control, and arrangements for control of traffic was not assumed until 1200. This engineer was frank to admit that he did not think the heavy ponton bridge would be completed early that same evening. Actually it was completed at 1845, and from that time on the roads were clogged with traffic moving without distance between vehicles.

Construction of the most difficult bridge of all three, the Bailey bridge, was begun at 0600, 26 March, and work continued



General Pershing tanks moving through Wesel, Germany at the Rhine crossing on 30 March 1945.—Army Signal Corps photo.

while the British columns flowed across the two already completed bridges. The 167th Engineers worked in shifts on this most difficult task, and by 1900, 27 March, the bridge was completed after only thirty-seven hours work. It was conservatively estimated by the engineer officers witnessing this feat that the time spent in training to overcome construction difficulties had reduced the construction time by at least 50 per cent.

The chart on page 51 gives a brief summary of the various group missions and their times of completion.

Various protective measures were used in this operation to prevent enemy destruction of the bridges. These defensive measures were highly organized, quite complete in detail, and very successful as no damage resulted to the installations from enemy action. In addition to booms, other protective measures were: patrol boats, underwater explosive charges, barrage balloons, searchlights, small arms, and direct fire AAA weapons.

Conclusion

That the operation was completely suc-

cessful can be attested by the fact that during the ten days that the bridges were maintained by the 1117th Engineer Combat Group an average of 8,000 vehicles crossed the Rhine River *daily*; the peak daily traffic being on 2 April 1945 when 10,500 vehicles crossed.

The success of the operation was the result of many factors but it is believed that the following are the major ones:

(1) *Early allocation of troops and equipment* to the major units of the group that were fixed with the responsibility of each phase of the operation. Such an arrangement allowed *detailed planning* by the subordinate unit.

(2) *Rehearsal* of the particular part each unit was to play in the over-all operation. In this manner all structural and engineering construction problems were solved in the security of the rear areas when time was plentiful; thus, when the crossing proper occurred all of the difficulties had been overcome.

(3) *Strict adherence to the principles of deliberate river crossing operations as published in current engineer field manuals.*

(4) *Centralized control of bridge traffic* under the Group to insure the timely arrival of priority bridging equipment at the bridge sites.

Lessons

Some of the lessons to be learned from this operation are:

(1) Much research and development is needed in the design and construction of all types of booms that are needed in the defense of bridges of this type. Although both the British engineers and some U.S. engineers had performed experimentation on various types of booms, there had been no standardization on a suitable design. Prefabricated types to expedite installa-

Mission	*Unit*	*Attached*	*Began*	*Ended*	*Time*
Treadway Bridge (Site 1)	248th Engineer Combat Battalion	1000th Treadway Bridge Company	251500	260400	13 hours (1,284 feet)
Heavy Ponton Bridge (Site 3)	551st Heavy Ponton Battalion	2 Companies 1253d Engineer Combat Battalion	252000	261845	22¾ hours (1,230 feet)
Bailey Bridge (Site 2)	167th Engineer Combat Battalion	536th Light Ponton Company	260600	271900	37 hours (1,415 feet)
Construct Roads	1253d Engineer Combat Battalion (—)	574th Light Equipment Company 2705th Dump Truck Company	251300	Continuous	
Construct Booms	551st Heavy Ponton Battalion	Company 1698th Engineer Combat Battalion	261800	281200	42 hours
Operate Engineer Dump	Company 1698th Engineer Combat Battalion		151000	Continuous	
Rhino Ferry Class 70	248th Engineer Combat Battalion (—)		261000	262000	10 hours
Clear Vessel	1698th Engineer Combat Battalion (—)		251600	271800	50 hours

tion will prevent a determined enemy from using floating mines, small submarines and underwater swimmers to destroy floating bridges.

(2) Transport of Allied Armies cannot be expected to make maximum use of U.S. bridges until standardization of vehicles and experience by the drivers conform to U.S. practice. The peculiarities of the treadway bridge particularly affected the British transport. Small staff cars were continually "bellying up" on the treads; Churchill tanks, with their extended tracks, would tend to climb out of the treadways and distort the bridge dangerously; British three-ton lorries lacked the power to pull off the bridge approaches, and it was necessary to keep a stand-by bulldozer near to tug the stalled lorries off the bridges. To many British drivers this was the first opportunity that was afforded them to use the treadway bridge; they were both inexperienced and apprehensive regarding its capabilities. Practice in driving across this bridge was the training used in the U.S. Army to build confidence in the user, and it is thought such an arrangement for Allied Armies is necessary if the full capabilities of this bridge are to be utilized.

(3) Confidence in the ability of subordinate commanders is the key note for success by the major commander. Assist the subordinate commander when he needs it, but let him know you are certain he can do the job and he will.

The technique of the modern aggressor is the "sneak" attack and American Industry stands out as a shining target for such a surprise attack. We must be ready with more deadly and advanced defensive and offensive weapons to defend ourselves than any potential enemy. Next time we must be able to stand alone from the very beginning of such an attack—and win. If we do not maintain the strength to do this, we are simply inviting attack.

Lieutenant General Henry S. Aurand

Intelligence Objectives

Colonel H. D. Kehm, *Field Artillery*
and
Lieutenant Colonel Page E. Smith, *Coast Artillery Corps*
Instructors, Command and General Staff College

THE publicity recently given to the work of German scientists in this country—articles such as "Secrets by the Thousands" in the January 1947 *Readers Digest* which described discoveries and devices uncovered by our armed forces during the war, the firing of German V-2 rockets at White Sands, and the evidence concerning the methodical procedure by which the Germans scientifically looted the countries they conquered—has tended to focus the attention of the soldier, the scientist and the average citizen upon an aspect of military activity in which our army is relatively inexperienced.

We refer to the discovery and exploitation of what, during the last war, were called "intelligence targets." The term was very loosely used, for usually it was employed to denote people, installations, equipment and documents of unusual importance in other than purely military fields. In many cases, too, it was used to designate targets of purely military interest. Thus, it included scientists' laboratories, military administrative headquarters, governmental and political party leaders and their headquarters, records, fissionable materials, stock piles of food, military supplies, and industrial plants such as steel, optical, automobile, and underground munitions factories.

This article does not propose to lay down a system for carrying on such work, nor does it express doctrine of the Command and General Staff College. Rather, it is a bit of history as experienced by the authors and a preliminary analysis of this history.

The typical examples which we have just mentioned indicate that the scope of "intelligence targets" is almost unlimited, and that the term is a poor one, anyhow, because we usually think of a target as something to shoot at, and often that is the last thing we should do to this kind of "target," at least in the literal sense. "Intelligence objectives" is a better term and is coming into more common use. Since it is so much more logical, we will use it in the remainder of this discussion, even though it does not have that most blessed of all sanctions—tradition.

We need not recapitulate the years of scientific research, and the thousands of new processes and products that have been made available to our military agencies and our civilian economy to prove the importance of this factor to the strategy and tactics of modern war. With scientific

Victory in a future war, and progress in the peace that follows, may depend as much on how well the military establishment takes advantage of intelligence objectives as on results obtained on the battlefield

and technological progress moving into constantly widening fields at an ever accelerating pace, that importance is increasing. Our armed forces must be alive to the fact that victory in a future war and progress in the peace that follows may depend as much upon how well our military establishment functions in this field as it does upon land, sea, and air operations.

Before we proceed further in this discussion we would like to make it clear that we are not suggesting that our armed forces become expert at looting in the sense that the Germans did in Belgium, France, and other invaded countries. We do contend, however, that our Army must be prepared to find out what the enemy has, locate it, study it, and use the knowledge thus gained to assist us in keeping at least abreast of him in research and development. We must also learn to use the enemy's resources to terminate war more quickly, and to make it less costly to our own people.

It was not until the final stages of the war that we became fairly efficient in finding out about such objectives, locating them on the ground, protecting them, and then securing the maximum returns from them.

Necessary Steps

In discussing this subject, we can probably best accomplish our purpose if we list and then examine separately the steps required in making optimum use of all classes of intelligence objectives:

Determining existing objectives.
Actually locating them on the ground.
Securing the objectives.
Initial assessment.
Providing experts to exploit the objectives fully.
Maintaining useful records and disseminating results.

Finding out that various kinds of objectives, for example heavy water plants, do exist is a challenging intelligence task. The scope of inquiry is unlimited, as is the number of potential sources. Travellers, scientific reports, news and radio reports, commercial and industrial transactions—these and many others are concerned and all may yield clues. Toward the end of the late war the interest aroused in all kinds of governmental, scientific and industrial agencies led to active and coordinated searches for such information, and also impelled the United States to strive to coordinate its efforts with those of our allies to get the maximum results. This part of the problem is readily solved if time, money and effort are put into it; however, it points up the need for the fullest integration of the efforts of every available intelligence agency.

Another aspect of the determination of intelligence objectives which needs more attention on the part of the armed services is that of being constantly alert to discover such objectives in the course of operations. It is quite obvious that we neither can nor should expect to make every soldier an intelligence bloodhound, because the serious job of overcoming the enemy confronting him is ordinarily his major concern in combat. On the other hand, if he is properly indoctrinated in this matter and will seek out and conserve enemy supplies and equipment that will help him in the fight, he may contribute to the discovery of a device or process that will shorten the war, he will help reduce the cost of war, and he may bring many peacetime benefits to his country. At least one of our armies made an effort in this direction, and while no earth-shaking finds were made, it is a fact that the number of objectives uncovered did increase.

Locating Objectives

After obtaining reliable information of the existence of an objective, it is necessary to locate it on the ground. This involves getting information of the known or suspected location to the proper unit in sufficient time to allow the unit to secure the objective. The mechanics of dis-

seminating information on the location of objectives is quite a problem. It can, of course, be done in an army, for example, by sending all such information to all the corps and divisions. This burdens lower units with the task of extracting pertinent items. It is an easy system from the higher echelon point of view, and has the advantage of full information and automatically taking care of changes in boundaries and dispositions of subordinate commands; but the disadvantages are obvious. A method under which a unit is given information only on objectives in areas likely to come under its control has complementary advantages and disadvantages, but we favor it because it has the effect of stimulating interest, since it makes the task appear less onerous, and because it can be used to provide a simple means for checking on the results attained. It is quite clear that enemy countermeasures and the exigencies of battle will cause much information of locations to result in wild goose chases. Here again, basic training and alertness to the problem will help, because properly-informed units will, by interrogation, document research and other means, seek to determine the location of objectives that have been displaced or moved, and will search alternative or likely areas.

Seizure and security of objectives is another task in which basic training can be of primary help. It is no exaggeration to say that lack of training and poor discipline has cost us millions of dollars through neglect and senseless destruction by our troops. In Europe, in particular, the depredations of the displaced persons who got to valuable targets before the troops, set an example which made the actions of the troops a logical consequence. It was quite distressing to see valuable scientific equipment and tons of munitions—sometimes food—ruined by a thoughtless act of destruction or by neglect. There is no good reason why we should not guard against such actions. In the past war it was found necessary to organize special forces to seize and protect certain objectives, either because the task was so great or because the objective was of particular value. In many cases such a force included not only the military power to secure and hold the objective but also special personnel to assess its value and to exploit it.

Initial Assessment

It can be said without fear of valid contradiction that the initial assessment of an objective is probably the most critical item in the whole matter of getting the best results. In the last war this was not too well done at the start. The result was that troops were often guarding an installation for long periods of time, only to have a specialist ultimately appear and declare the objective worthless. The obvious solution, of course, is to have the specialists ready on call to make assessments, but using them on assessment reduces the time available for exploitation, and we will never have enough for proper, timely exploitation. A plan that provided some help was to have an assessment and recommendation made by the nearest available special staff officer. Thus, if a regiment uncovered an electronics laboratory, the Division Signal Officer could make an initial assessment. If the situation went beyond his knowledge, he might call on the Corps Signal Officer. This scheme had some objections, but it did help materially to reduce the number of glaring errors. Theater headquarters sometimes prescribed that a given objective be sealed and guarded, and that assessment and exploitation be by theater representatives only. This, we believe, was unnecessarily cautious. Only in the most unusual cases can such instructions be deemed advisable.

Exploitation is the logical sequence to assessment. Here specialists are definitely needed. Again, qualified special staff officers can be most helpful, but the exploiters must be capable of deciding what

is wanted from the objective and what samples, records and descriptions need to be secured, and be able to advise on methods of packaging and shipping. Specialists of this caliber were always lacking in Europe; in fact, General Electric, in its last annual report, states that the experts they furnished had to be flown to Europe to study certain objectives.

A few moments of reflection on this task of exploitation will reveal that military units must accredit, transport, and feed the experts, and provide clinical and labor assistance for them. They must also package and transport records, equipment and sample items. In one army area this administrative task involved three medium sized hotels, some fifty motor vehicles and roughly the equivalent of a battalion of men and officers; however, supply and the evacuation of materials fitted into the normal supply and evacuation operations with relatively minor special requirements, which were occasioned mostly by special packaging, ranging all the way from those for delicate optical equipment to those for the V-2 rocket case.

Records and Dissemination

Inherent in the entire process was the need for the inevitable records and for proper dissemination of results. Highest headquarters needed to know what was found, when, and of what value. Provision had to be made for directing specialists to objectives, briefing them on the results of assessment and notifying all interested agencies of the nature and state of what was found. Specialists had to be identified, and a record of at least the salient features of their reports had to be made. The physical task of keeping all the interested staff and command agencies within an army properly informed was no small task. It was done through a form of "objectives" report, which gave a running account of new objectives and the state and result of exploitation of old ones. These "objectives" reports proved to promote efficiency in exploiting the targets, and were of tremendous help to the political as well as the military agencies of our government.

It might be interesting to glance briefly at the history of this type of operation in our army in the past war. The first real planning and execution for intelligence objective operations was done by Allied Force Headquarters in North Africa in the capture of Tunis. A force was organized for the purpose of capturing, guarding, and exploiting certain key intelligence objectives in the city. This force consisted of troops to capture and guard the objectives, scientists and technicians to assess and exploit them, and necessary administrative personnel and equipment to support the operation. This force was quite small and the scope of its operations limited as compared to organizations for later operations on the continent of Europe. However, it was the basis for all future intelligence objective operations. This special force was assembled outside Tunis before its capture and all personnel were briefed on their duties. When the city fell, the unit moved in to execute its mission.

The results of this operation were much more successful than had been expected. From the lessons learned in the Tunis operation, an improved operation was planned for the capture of Rome. Again, the results far exceeded expectations.

As a result of these and other operations, and because of the growing realization of the wealth of material that could be secured in Northern Europe, large-scale plans were made for the exploitation of objectives in France and Germany.

The organization of special forces such as these is always a painful drain on manpower, as is super-specialization in any organization. In the future, for very special objectives, we must expect such forces to be organized, no matter how much the combat units concerned may feel that

they are being imposed upon. However, it will be better to organize more combat units from our total manpower, and as a matter of routine give these combat units the task of guarding all but the most important objectives. By proper indoctrination, they will realize that the end justifies the means—that this is an essential part of war and battle.

In this connection, no one can deny the importance in any war today of properly exploiting an enemy process to use hydrogen or helium in an atomic missile, or of seizing a stock of fissionable material, a scientific laboratory, a top-flight government official or a vital foreign office record. Although these matters are of widest military and governmental interest, the ultimate responsibility for performing the task must necessarily fall within the field of intelligence.

Reflection on what has been said clearly indicates that our integrated national intelligence agencies must provide the guidance and coordination in determining intelligence objectives. It also indicates the fact that on a national scale—international, if we fight as part of an allied force—we must arrange for experts to coordinate and guide the exploitation. Finally, for the combat soldier, it means an additional job. He must be alert to these matters, and so far as the exigencies of combat allow, he must be prepared to seek, seize, secure and, in the more simple cases, assess such objectives. In special cases they may be the goal of his fighting. While the United States has so far always fought a war of plenty in the matter of men and resources, few people who have given the matter serious thought estimate that we will be so fortunate if war comes again. In a war of scarcity, we will be immeasurably helped if we know how to take fullest advantage of "intelligence objectives."

The most powerful influence for peace on earth today is the spiritual force exerted by a strong nation of free peoples who have the will to remain free and who are determined to assist free men everywhere to protect their cherished freedoms. We must make our determination abundantly clear to the world if we are to prevent the holocaust of another World War.

Lieutenant General Albert C. Wedemeyer

Supply Discipline

Lieutenant Colonel Carl W. Kohls, *Quartermaster Corps*
Instructor, Command and General Staff College

WORLD War II showed that American wealth, expressed in manpower, was no longer inexhaustible. Also, the increasing limitations on our material resources were known by some, but it is a sad commentary on our mode of living in the United States that only too few realized this fact.

Too many soldiers and officers during the past war were extremely lax in trying to conserve the supplies and equipment on hand. Many seemed to feel that it was merely a problem of requesting new items of equipment from supply sources whenever they were needed to replace lost or damaged items. When rations, spare parts, gasoline or ammunition or any items of equipment were not available in the quantities desired, something was wrong with the supply distribution system as far as these shortsighted individuals were concerned. It was not realized that poor supply discipline generated demands that no supply system could fulfill. The desired quantities of supplies would have been available if supplies on hand had been fully utilized.

World War II showed us that the production of needed equipment involved enormous efforts on the part of workers in our factories, and also that extremely large quantities of many basic materials were required to produce the equipment. The transportation required to move all of the supplies and equipment to the many theaters of operation was never adequate to meet all of our requirements. Should our country again be involved in a global war, we can well realize that because of the increased use of mechanical and technological equipment the production problems of the future will certainly make the World War II production problems seem simple in comparison, just as the World War II made World War I problems seem easier. In order that any future plan of operations be good, the necessary administrative problems must be emphasized from the start. This means that supply discipline must be stressed equally with other disciplinary measures. During the past war, General Omar N. Bradley considered these two terms as synonymous when he said: "Supply discipline goes hand in hand with military discipline."

What is supply discipline? Before defining this term it probably would be well to see what our texts tell us about discipline alone.

According to Army Regulations 600-10, military discipline is defined as ". . . that mental attitude and state of training which render obedience and proper conduct instinctive under all conditions. It is founded upon respect for, and loyalty to properly constituted authority. While it is developed primarily by military drill, every feature of military life has its effect on military discipline. It is generally indicated in an individual or unit by smartness of appearance and action, by cleanliness and neatness of dress, equipment, or

quarters; by respect for seniors, and by the prompt and cheerful execution by subordinates of both the letter and the spirit of the legal orders of their lawful superiors."

Technical Manual 20-205 furnishes this definition of discipline: "State of order and obedience among soldiers, brought about by training, necessary to carry out orders in the proper spirit. Systematic rules and procedures established for specific operations; for example, march discipline, camouflage discipline."

Definition

In the last definition, the term "supply discipline" could well be added to the examples given. With these two definitions of discipline before us, we can give the following as a good definition of supply discipline:

Despite a comparative abundance of national resources, lack of supply discipline will generate demands which no supply system can meet. Only by the practice of conservation can logistical requirements be met

"Supply discipline is the development by instruction and exercise of the rules and procedures required to instill in every individual of the Armed Forces the habit of conserving, maintaining, safeguarding and salvaging food, clothing, weapons, fuel, motor transportation, matériel, and supplies of all kinds."

Numerous examples of poor supply discipline may be found in the study of the records of the past war. A narration of some of these examples would show us that poor supply discipline is not restricted solely to the individual soldier who throws or gives away part of his rations, or the driver of a vehicle who wastes gasoline by spilling it while carelessly filling his vehicle tank.

Rather than listing many of the instances of poor supply discipline which occurred during the past war, a better purpose would be served if instances where corrective action was taken were given. Before listing these instances it would be apropos to state that carelessness, neglect, poor handling and inadequate training took a heavy toll of our supplies and equipment. If all of us made it our duty to overcome these traits of carelessness, we could assure ourselves that many of these practices would be overcome by adequate training. A few examples will serve to show what good supply discipline can accomplish.

Good Supply Discipline

During the early stages of the past war, one division was having considerable motor maintenance trouble. Too large a number of vehicles were constantly deadlined. Parts were wearing out too rapidly, and due to the shortage of replacement parts and tires, the vehicles, of course, were deadlined. A two weeks course of instruction was given to all officers of the division, which made them more motor maintenance and supply discipline conscious. The result of this instruction, soon made evident, is shown in the accompanying chart.

EFFECTS OF TRAINING

	Number Vehicles Assigned	*Number Vehicles Disabled*	*Per Cent Disabled*
February	1234	37	3.0
March	1302	35	2.7
April	1243	18	2.0
May	1660	5	0.3
June	1649	6	0.4
July	1331	5	0.4
August	1819	5	0.3
September	1895	2	0.1

In 1943 American Forces in England were being criticized for wasting too much food. The negative "stop wasting food" idea was converted into a positive "save food" idea. After a study of the situation had been made, a plan for the conservation

of food was placed into operation. The plan required that each individual be schooled to know, understand and believe in the idea. Messes were changed to cafeteria style with the individual helping himself.

For everyone the rule was: "If you take it, you eat it." Mess Sergeants received more training in the best way to utilize foods, especially dehydrated foods. Preparation of left overs in an inviting and appetizing manner was emphasized. Kitchen waste was practically eliminated. The over-all effect of this plan was a complete stoppage of waste, and a positive saving, measured in the Eastern Base Section by an actual underdrawal of rations by 7 per cent over a sustained period of months and related to units performing hard physical work. No person was deprived of any essential food, in fact, the troops were better fed than before. To get an idea of what a 7 per cent underdrawal of rations would mean to a large force, consider that a force of 500,000 men subsisting on the Type "A" field rations would normally consume about 53,250 tons of rations a month. If a 7 per cent saving in rations were effected, it would allow for over 3,700 tons of other supplies to be shipped to the theater monthly.

Our nation is still comparatively rich in resources compared with many other nations. We do have the industrial organization, the manpower, and the "know how" to produce the necessary supplies and equipment needed in war; but only if we practice conservation.

Supply Training

In order that the Armed Forces may do their utmost in helping to conserve our wealth in money and resources, each individual must be well indoctrinated in supply discipline by a continuous training program.

Training in supply discipline should not only teach the individual how he may conserve, maintain, safeguard, and salvage all items of matériel and supply, but should also cover the reasons for the training program. The American soldier is not the type of individual who can be ordered to do something in blind obedience. This trait may be found in armies of other nations, but we have an intelligent individual who likes to know why he is supposed to do a thing in a particular manner. We are lucky in this respect, for with the inherent intelligence of our soldier, he can more easily be taught why something should be accomplished in the right manner.

Let us consider how items may be conserved, and in so doing learn more about supply discipline. Food is an extremely important item of supply. The food purchased for the army is of a good quality, and places our soldiers among the best fed in the world. All of this food should reach the individual consumer, the soldier, and none should be wasted after it reaches the soldier. More than the necessary amounts should not be requisitioned, and after the proper amounts have been received, improper storage methods must be eliminated. Butter and eggs will become contaminated if stored with fish and onions. Close supervision will prevent wastage during the time food is stored.

To prevent wastage in prepared foods, the food must be prepared in a palatable and appetizing form. This means that personnel charged with the preparation of this food must be well trained. Good men must be selected for food service supervisors, mess stewards and cooks. If individuals are selected for these positions in accordance with the provisions of the Food Service Program as outlined in War Department Circular 50, 21 February 1947 (as amended), we definitely will be able to conserve food while it is being prepared.

The soldier, realizing that steps have been taken to conserve his food and prepare it in such a manner as to make it desirable to him, will more easily be indoctrinated with supply discipline. He will





Supply discipline is attained only by the constant effort of all troops. Above, an orderly ration dump in North Africa, operated by the 85th Quartermaster Battalion. Below a haphazard supply point.—Army Signal Corps photos.

be more prone to eat everything he has taken, and will not want to empty a large portion of his food into the garbage container.

The many items of clothing furnished all individuals represent the outlay of large amounts of money by the government. This clothing should be taken care of in the same way that the individual would care for his own civilian clothing, purchased with his own funds. Necessary repairs made at the proper time, and continued laundering and cleaning, will preserve the items and increase the life of the clothing. When the cost of replacement items is reduced, the money so conserved may be used to advantage for the procurement of ammunition, which, in the long run, reduces the over-all costs to the government and consequently to all individuals in the form of taxes. In combat it is more important to use transportation for ammunition than for clothing.

Once a soldier has participated in battle he soon finds that his weapon is his best friend and often is the difference between life or death; consequently, great care should be devoted to the upkeep of all weapons. Not only should they be kept clean from dirt and rust, but it should be remembered that the loss of a rifle part may mean not loss of pay, or K.P., but immobilization of the rifle.

Modern warfare requires enormous amounts of gasoline to propel the innumerable vehicles, aircraft and other mechanical items of equipment. Extreme care must be given to the handling of gasoline and oil to prevent wastage. A small amount of spillage per vehicle can amount to very large losses. Seven gallons of gasoline wasted by each of 10,000 vehicles during a month would furnish enough gasoline to move an Infantry Division 100 miles.

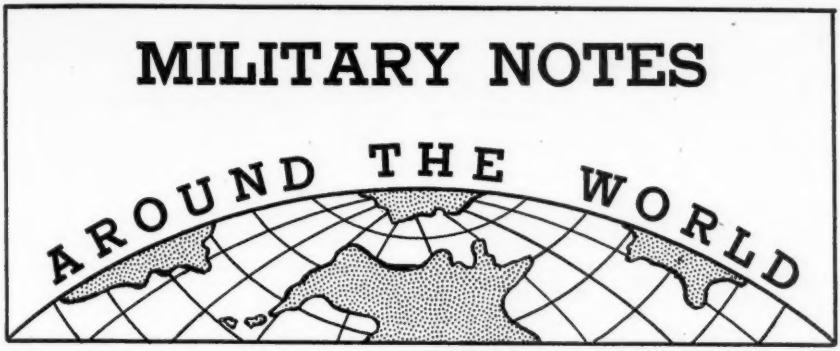
Motor vehicles need constant care and attention. By this it is meant that the driver must continuously perform his first echelon maintenance at *every opportunity* available to him. The following lines, a parady on an old English proverb by George Herbert, very aptly show the importance of first echelon maintenance.

For want of some air, the tire was lost,
For want of a tire, the truck was lost,
For want of a truck, the supplies were lost,
For want of supplies, the battle was lost,
For want of a battle, the campaign was lost,
For want of a campaign, the war was lost,
For loss of the war, we are all lost.

Appropriate field and technical manuals specify the proper use, care and preservation of equipment in the hands of troops. These manuals should be utilized in training programs. They will place the necessary knowledge of equipment in the hands of troops, so that this equpiment may be conserved in the best manner possible. In doing this, the individual will become more disciplined in supply matters.

The limited funds available to the Department of the Army make it a compelling necessity to conserve these funds to the utmost. The maximum amount of use from these funds may only be obtained if all individuals in the Armed Forces exercise the greatest care and preservation of all supplies and equipment. Although it is a command responsibility to insure that a high standard of supply discipline be attained and maintained in all echelons, it is only by the constant effort of all individuals that this high state of supply discipline will be made possible.

MILITARY NOTES



GREAT BRITAIN

Small Plane Turbines

New developments in gas-turbine and jet propulsion of aircraft recently revealed in London include the Rolls-Royce Dart, claimed to be the first propeller-jet engine of small power to fly; the Napier Naiad, one of the smallest gas turbines in the world; and a jet-propelled fighter capable of over 600 miles an hour.

The Dart, a gas turbine driving a propeller, is intended for use in aircraft such as military trainers, but is regarded as ideal for middle-sized commercial planes. It is rated at 1,000 horsepower.

The Napier engine is arranged to drive a rotary propeller and also to give jet-propulsion from its exhaust gases. It is an axial-flow engine, 28 inches in diameter and eight and one-half feet long. It weights 1,095 pounds and generates 1,500 horsepower, using kerosene.

The new jet-propulsion fighter has already made its first flight. Still on the secret list, it is known only by the designation N7/46. It is expected to furnish the British Navy with a craft superior to anything of its type in the world. It is powered with a Rolls-Royce Nene turbo-jet engine which develops a thrust of 5,000 pounds.—*Science News Letter.*

Observation Plane

The Heston A.2/45 is a new British artillery observation plane, of the pusher type, with a 240-hp Gipsy Queen engine. Its characteristics include short take-off and landing runs, high initial rate of climb, and good low-speed handling qualities.—*Aero Digest.*



British Heston A.2/45.

Bomber Forces Stressed

Britain is devoting special training to her bomber forces to enable a substantial weight of air power to be developed at short notice in any area where it might be required.

The Air Secretary disclosed that the re-equipment of fighter squadrons with jet-propelled aircraft was continuing. The total personnel strength of the RAF in the coming year will be 325,000—a reduction of 45,000.—*The New York Times.*

INDIA

Dispute in Kathiawar

Considerable confusion has resulted in the sub-continent of India following the division into the new states of Pakistan



Indian troops landing at Jafarabad, Kathiawar.

and India. Typical of the difficulties is the situation in the Kathiawar States, on the west coast, where Junagadh, with a Hindu majority and a Moslem ruling dynasty, acceded to Pakistan, but two of its feudatories acceded to India. Although both India and Pakistan have outlawed war under a recent joint declaration, both governments sent troops into the Kathiawar area.—*The Sphere*, London.

CANADA

Air Rescue

Specially trained for search and rescue work, a Special Air Service Company of volunteer troops has been formed by the Canadian Army. The group began training in November at the Joint Air School, at Rivers, Manitoba. The unit is organized into a headquarters detachment and three platoons.

A few officers and NCOs have already been trained and have taken part in several rescues. Last October SAS men parachuted to the aid of a missionary, after making a 1,700-mile journey to Moffet Inlet, 400 miles north of the Arctic Circle.—*The Aeroplane.*

IRAQ

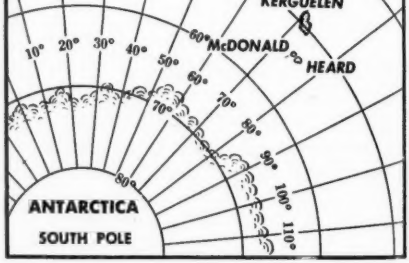
Military Mission

Some two months after Iraq declined a new treaty of alliance with Great Britain which would have provided joint defense boards and Iraqi bases for the British, the two governments announced that the British advisory military mission would be withdrawn by May.—Associated Press.

SOUTH AFRICA

Potential Air Bases

The flag of the South African Union has been hoisted on unoccupied islands of the Prince Edward Group in the Southern Indian Ocean, where an air base may be established. A South African expedition occupied the Antarctic islands, about 1,500 miles from Capetown, about the first



of the year. At the same time, an Australian Naval party landed on Heard Island, about 1,000 miles southeast of Tasmania.—*The New York Times.*

FRANCE

Military Reorganization

The Premier of France has revealed that the manpower shortage would necessitate discontinuance of the manufacture of certain types of military equipment, necessitating a general overhauling of France's military policy.

The Premier said that while France could not manufacture certain types of arms and other military equipment now standard in other countries, she would continue a certain amount of research for her own use.

It was reported that certain important consolidations would be effected in France's army, navy and air force. Several high ranking officers in the armed forces openly favor basing France's military policy on the supposition that the United States would furnish the bulk of highly mechanized equipment for use in wartime.

Consolidation of many activities of the armed services will be studied at the Army, Navy and Air Force combined school for advanced study, now being set up.—*The New York Times.*

French Research Jet

A new French aircraft designed for research purposes is the Arsenal VG-70. It has swept-back wings and tailplanes,

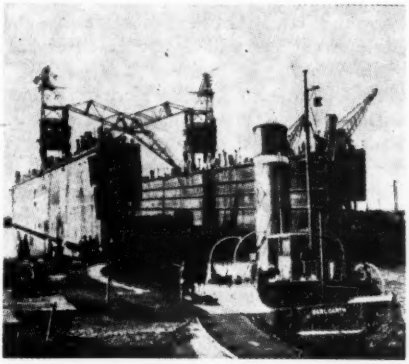


and the power-plant is a Junkers Jumo 004B gas turbine. The wings are wood, while the fuselage and tailplane are metal.—*The Aeroplane Spotter.*

GERMANY

Floating Dock

A German floating dock, part of Germany's war reparations to Great Britain, has been moved to Barrow-in-Furness,



German floating dock to Britain.

Lancashire, by two sea-going tugs which took two weeks for the operation. The dock is of modern design, all-electric operated, and has a lifting power of 9,000 tons.—*The Sphere,* London.

POLAND

Uranium Deposit

Poles are feverishly developing what their government regards as Europe's second largest deposit of uranium, a basic element of the atomic bomb.

A large mine is in operation in Lower Silesia sixty-two miles southwest of Breslau. The mine, which is closely watched and restricted, is said to employ 1,200 men. The Poles have been exploiting the find since 1946.

It is believed that the uranium ore found thus far has been of a relatively poor grade. However, the Poles are optimistic that further development will show the extent of the deposit is exceeded in Europe only by that in the Soviet Union.—*The New York Times.*

PANAMA

Mapping Aid

"Chaff," the aluminum foil used to confuse enemy radar warning systems, is being utilized in a new and novel manner by United States Army Engineers working from the headquarters of the Caribbean Command at Quarry Heights, Canal Zone.

The aluminum foil, which resembles Christmas-tree tinsel, is dropped from airplanes to mark designated high spots in the jungles of Panama. This facilitates the mapping of that entire country, now being carried on by the United States Army Engineers working in ground survey parties proceeding through the jungle on foot.

Formerly, to obtain geodetic information, the survey parties had to climb all the peaks in each locality to determine the highest summit. Now, an airplane flies overhead, determining the highest point among several with its nontarnishable chaff on the loftiest peak, from where it is visible for several miles. Days of climbing are saved.

This inexpensive marking device may become a standard mapping procedure in jungle areas throughout the world when its efficiency has become established.—*Science News Letter.*

ARGENTINA

Argentine Plane

Further details are available concerning the Colibri (Hummingbird). The Colibri was designed by the Instituto Aerotecnico de Cordoba as a two-seat, elementary, low-wing trainer with fixed, tail-wheel-type undercarriage and of mixed wood and metal construction. Designated the I.Ae.31, the prototype Colibri was built by the local Cordoba manufacturer, H. Goberna, and was first flown at the Technical Aeronautical Institute's nearby Cordoba airfield. The power plant is a 155 hp Blackburn Cirrus Major III.—*The Aeroplane Spotter.*

ARGENTINA-CHILE

Trans-Andean Railway

A new railway between Argentina and Chile, crossing the Andes at Cumbre Albra Samenta at an elevation of 14,282 feet, has been officially opened. Twenty-seven years under construction, the railway connects the Chilean port of Antofagasta with the northern Argentine city of Salta, through the border town of Socompa. The line passes through 23 tunnels.—*The New York Times.*

AUSTRALIA

Rocket Range

The Federal Cabinet has approved an initial expenditure of $10,560,000 for work on the rocket range in central Australia. This is part of the $105,600,000 already allocated for scientific research and the development of defense work in Australia. Development of the guided weapons range project includes bringing from England 200 scientists. Housing schemes, installation of water supply, construction of roads and bridges, provision of railroad and railroad services along the route of the range are being considered by a special cabinet subcommittee.—*Australian News Summary.*

Citizen Air Force

Four Citizen Air Force fighter squadrons have been established in Australia. They are equipped with Australian-built Mustangs and at a later date will be equipped with Australian-built Vampire Jet fighters.

Each of the new squadrons are manned by approximately 40 per cent permanent Air Force personnel and 60 per cent part-time citizen Air Force volunteers. The squadrons are known as "City of Brisbane," "City of Sydney," "City of Melbourne," and "City of Perth." Each is situated in the vicinity of these state capitals.—*Australian News Summary.*

CHINA

Joint Service Education

In order to meet the requirements for National Defense, the National Defense Ministry will reform military education courses in China. Joint education of land, sea, air and combined service will be given to students so that they will have the spirit of cooperation and be capable of command and staff duties in joint warfare. The duration of the course of education will be four years, of which the first two years are for general education and the last two years for specialized training. The qualifications for entering the course will probably be: (*a*) Age 18 to 22; (*b*) Graduation from Higher Middle Schools or equivalent; (*c*) Citizenship of the Republic of China; (*d*) Good character, loyalty and physical perfection.—*Journal of the Royal United Service Institution.*

TURKEY

Air Training

Under the United States Turkish Air Program, forty-five Turkish Air Force Officers are in the United States for twelve months technical and staff training with the U.S. Air Force.

Ranging in grade from lieutenant to lieutenant colonel, the trainees will receive on-the-job instruction in tactical operations, air staff functions, maintenance and supply, communications, radar, and headquarters operation.

The group has been divided into several units, each of which includes an English-speaking Trukish officer to act as interpreter. The units are being trained separately at various USAF bases and will be rotated as phases of their instruction are completed.

Upon their return to Turkey, the officers will be assigned to new staff and tactical positions for which their training by the USAF will have fitted them.—*Armed Force.*

THE NETHERLANDS

Dutch Navy

The majority of the ships of the Dutch Navy are in the East Indies. Those in home waters are chiefly employed in training.

The principal units are:—

One carrier-escort, the *Karel-Doorman* (ex-*H.M.S. Nairana*).

Two Light cruisers of 4,150 tons, the *Tromp* and *Jacob-Van-Heemskerck.*

Six destroyers of 1,800 tons, bought from Britain.

Eight submarines; 3 bought from Britain, the remainder obsolete and used only for training.

Six escort vessels, including one ex-British frigate.

There are also a number of coastal craft, minesweepers, and auxiliaries.

Two 8,350-ton cruisers, which were being built when the country was overrun, were found intact on liberation. The Germans had continued their construction and one had been launched in 1944. They are being completed but their armament is being changed so as to equip them as antiaircraft cruisers.

A projected ten-year program aims at providing three task forces, each to consist of a light aircraft carrier, two antiaircraft cruisers, eight destroyers, and auxiliaries; also a reserve consisting of a fourth carrier, two cruisers, and twelve destroyers. It seems unlikely, however, that this program will materialize in the specified time.—*Journal of the Royal United Service Institution.*

NORWAY

Salvaging the "Tirpitz"

Salvage operations have been started on the German battleship "Tirpitz," sunk off Tromsoe in 1944 by British bombers. It is expected that salvaging of the vessel will yield at least 10,000 tons of scrap for Norwegian works and shipyards.—*Journal of the Royal United Service Institution.*

UNITED STATES

Shoulder Harness

Many wartime Army and Navy pilots were saved from disfigurement or death by a shoulder harness which protected them in plane crashes. Although a British pilot invented an effective shoulder harness in 1917, the device was not adopted in the United States until World War II. The US Army Air Forces adopted the harness in December 1943, and the Navy adopted it in June 1942.

The Air Force shoulder device consists of two lengths of one and three-quarter inch webbing, which pass over the shoulders and over a bar at the back of the seat, where they are joined and attached to a locking mechanism. Metal fastenings at the front ends of the straps fit into the tongue of the seat belt lock. Throwing a single lever releases shoulder and seat straps simultaneously.



Shoulder harness protects pilots.

After the harness is adjusted and hooked into the seat belt fastening it can be controlled by a lever on the left side of the pilot's seat. When the lever is in the unlocked position, the shoulder straps are loosened, allowing the pilot to lean forward and turn his shoulders freely. The locked position puts tension on the straps and holds the pilot firmly against the back of the seat.—*Flying.*

Training Civilians

A selected group of 135 outstanding men from among Chicago's leaders in industry, economics and education went back to school—summer school—or rather school came to them.

The Industrial College of the Armed Forces moved part of its faculty to the Chicago Museum of Science and Industry early this summer for a unique two-week's course.

There the professors of the armed forces presented a concentrated course on the problems of economic and industrial mobilization.

The project is part of a special long-range program designed to reach men who will probably hold key positions in industry and education within the next decade.

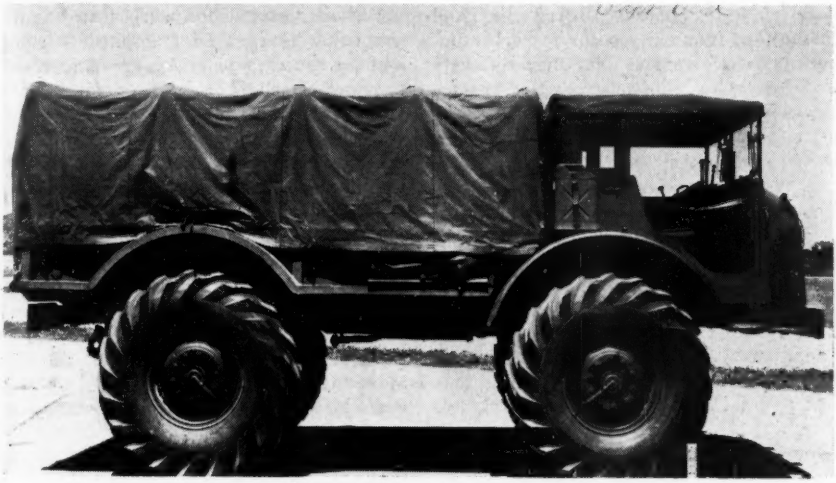
The courses are being brought to key centers to reach busy men who ordinarily would not be able to absent themselves from their businesses for a trip to Washington.

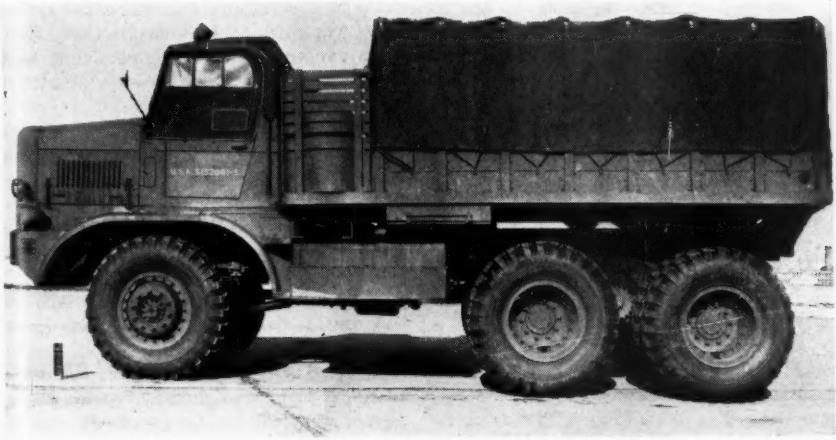
Among the eighteen subjects of the Curriculum were the organization of government for national security, the impact of new weapons on war, plant protection and dispersal in civilian defense, economic intelligence, geopolitics, and planning for industrial mobilization.—*The New York Times.*

Discharge Certificates

The United States Army now is issuing discharge certificates to officers being discharged from the service instead of the certificates of service formerly used. The new certificates are uniform for all branches of the Armed Forces, and are the result of a recommendation by a joint committee from the Army, Air Force, Navy, Marine Corps and Coast Guard that met in 1947 to draw up uniform discharge regulations for officers of all the Armed Services.—Department of the Army.

Two New Trucks





Among the trucks being developed at the Ordnance Department's Aberdeen Proving Ground are these two types. Above, 2 ½-Ton, 4 x 4, Cargo Truck T23, of unconventional appearance. Below, Truck, 8-Ton, 6 x 6, T28.

Insects of the Arctic

Even a trip to the Arctic regions will not guarantee freedom from the annoyance of biting insects. Biting flies and mosquitoes frequently occur in such numbers in Arctic regions that they seriously interfere with outdoor activities. Investigations were undertaken in 1947 to learn more about these insects and what can be done to control them.

A field party of representatives of the Department of the Army, and the Bureau of Entomology and Plant Quarantine, US Department of Agriculture, worked in Alaska with headquarters at Anchorage. A second party was established at Churchill, Canada, in cooperation with Canadian agencies.

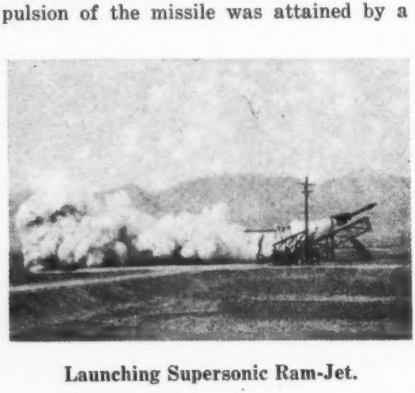
In Alaska, eighteen species of mosquitoes, at least nineteen species of blackflies, and fourteen species of horseflies, among other insects, were collected.

Various insecticides were tested, with promising results. DDT applied to snow and ice covering potential breeding areas provided excellent larval control. Aerial spraying tests indicated satisfactory larval control by this method. Tests of four standard repellants indicated that dimethylphthalate was most effective, providing about six hours protection.

Research on the control of biting insects of the Arctic will be continued this year. It is believed that this work will result in development of methods to provide both area control for fixed installations and methods of protection for the individual or small group in the field.—*The Bulletin, US Army Medical Department.*

Supersonic Ram-Jet

An aerial missile powered by a ram-jet engine "far exceeded" the speed of sound during its first test flight by the Navy Bureau of Ordnance at the Inyokern desert test station in California. Initial propulsion of the missile was attained by a rocket, which dropped off when sufficient speed had been attained to operate the ram jet.—*The New York Times;* U.S. Navy photo.



Launching Supersonic Ram-Jet.

Arctic Indoctrination

The Alaskan Air Command has organized an Arctic Polar Indoctrination School at Nome, Alaska, to instruct flying personnel in methods of survival in the Arctic in the event of a crash.

The forty-five instructors of the school are experienced Arctic veterans, familiar with Alaska and possessing the know-how necessary to survive in the Arctic cold. Eventually all flying personnel permanently assigned in Alaska will attend the school.

Instruction is given throughout the winter, with student personnel rotating each week. After intensive classroom instruction, the students are required to spend four days in the open under simulated crash conditions, two days being spent on the ice pack in the Bering Sea, and two days in the wild interior of Alaska. During this field work, the students learn at first-hand the difficulties they would face under actual conditions, and the preparations that are necessary for successful survival in the Arctic.—Department of the Air Force.

Atomic Radiation Fighters

America's major medical effensive against exploding atoms will get under way in a few months through the creation in Rochester, New York, of a new kind of medical school. This atomic medical school is a part of the University of Rochester and supported by the Atomic Energy Commission.

The school will take about 100 students at a time. About 30 of them will be taking short courses in health physics and protection techniques, including dust counts and other radiation measurements and blood chemistry. Another 30 will be college or university graduates studying for doctor of philosophy degrees. These will spend at least three years at the school. The remaining 40 will be doctors of medicine, doctors of philosophy, or Army officers. Army and Navy doctors in this group will probably take a one-year course, civilian doctors a two-year course.—*Science News Letter.*

Air-Ground Problem

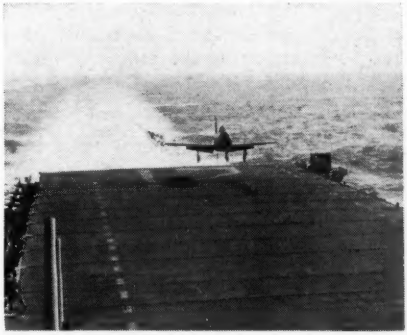
In the largest joint Air-Ground problem held since unification of the Armed Forces, cargo planes of the Twelfth Air Force Troop Carrier Group, McCord Field, Washington, transported infantrymen of "Yukon 'D'" from Fort Lewis, Washington, to Nome, Alaska.

The 3,000 mile air lift was accomplished with stops at Great Falls, Montana, and Big Delta, Alaska.

The problem was executed in connection with "Exercise Yukon," in which 250 officers and men engaged in developing tactics for a winterized, airborne infantry near an airport in Western Alaska. "Exercise Yukon" also served as an air indoctrination course for the men of the 2d Infantry Division, Fort Lewis, Washington, and supplemented other tests conducted by Army Field Forces of men and matériel under extreme climatic conditions.—Department of the Army.

Jet Planes for Carriers

The Navy's air arm has demonstrated for the first time the practicability of high-speed jet-plane operation from an aircraft carrier. The success of the operation had been highly problematical. The FJ-1 North American Fury's minimum landing speed is 110 miles an hour, about twenty miles faster than the wartime propeller-driven planes.



FJ-1 Fury landing on carrier.—US Navy photo.

On the carrier deck of the *USS Boxer* off California, the jet plane had to come to a stop in less than 400 feet, aided by hydraulic-snubbed arresting cables on the deck catching a tail hook on the plane.

Wartime planes pulled these cables out seventy-five to ninety feet. It was thought the new jet craft might stretch them close to their maximum 150-feet extent, or even break them and nose over in a crash. Instead, the fighter rolled to a stop in ninety-three feet.

The carrier was making about 30 knots into an 8-knot headwind, giving the plane the advantage of a relative crossdeck wind of 38 knots.—*The New York Times.*

Miscellaneous Notes

Inter-American Treaty

The treaty of reciprocal assistance signed by the American republics at the Inter-American Conference for the Maintenance of Continental Peace and Security at Rio de Janeiro on 2 September 1947 has been ratified by the following republics: Dominican Republic, United States, Panama, Colombia, Honduras, El Salvador, Mexico, Paraguay, and Brazil.—News reports.

Zipper Bags for Aircraft

By using a new form-fitting zipper bag and drying agents, the Navy expects a faster and more effective system for short-term preservation of aircraft in storage. Only 30 man hours are required to protect the plane and to make it ready for flight again.—*Army and Navy Register.*

Harbor Dredge

A giant dredge for clearing the channels of New York harbor has been built for the Corps of Engineers. It is capable of moving 6,000 tons of mud in an hour.—*Science News Letter.*

Canol Pipeline

Activation of an idle section of the Canol pipeline between Whitehorse, Canada, and Big Delta, Alaska, has been authorized by the Department of the Army. This move, costing less than $5,000, will permit pipeline movement of diesel oil for military consumption from Skagway to Fairbanks.

The line between Whitehorse and Big Delta represents the center portion of a line extending from Skagway, where oil shipped by tankers from West Coast ports is unloaded for transportation. Sections between Skagway and Whitehorse and between Big Delta and Fairbanks were rehabilitated last year. Heretofore, oil for military consumption at Fairbanks was carried by rail from the ports of Whittier or Anchorage.—Department of the Army.

Air Transportability

Air transportability has become a major part of the training program of Ground Forces troops stationed in the Panama Canal Department. An Air Transportability School has been established at Fort Gulick in the Canal Zone with classes in theory, demonstration and actual flights to give the ground soldier a working understanding of troops and matériel movement by air. On completion of the training in the Atlantic Sector, the school was to be moved to the Pacific side of the Isthmus.—Caribbean Defense Command.

Cure for Poisoning

Lead poisoning, once a hopeless disease, can be cured by a chemical developed during World War II to combat war gas. The chemical is BAL, or British Anti-Lewisite, which is effective in treating poisoning due to mercury, arsenic and other heavy metals.—*Science News Letter.*

Naval Observatory

The United States Naval Observatory, after 100 years in the nation's capital, is being moved to a new location which will be east of the Blue Ridge Mountains. The move is being made from Washington because of heat reflection from large buildings, and because of dust and haze.—Associated Press.

Chemical Fights Disease

Nitrogen mustard, a gas used in chemical warfare, has been found useful in the treatment of mycosis fungoides, a rare but usually fatal skin disease.—*Science News Letter.*

Air Training

Students of the Air Force Bombardment School, Mather Air Force Base, Sacramento, California, are now being triple-trained as navigators, bombardiers, and radar observers.—Department of the Air Force.



Desert Warfare

Translated and digested by the MILITARY REVIEW from an article by André Gimond in "L'Armée Française" (France) October and November 1947.

THE spectacular advances of the English across the Libyan desert, followed until 1942 by precipitous retreats, drew the attention of the entire world to the battle in the desert. So important was this fighting to save Egypt from the enemy, that other fighting carried on in desert countries was nearly overlooked. The conquest of Italian Somaliland and Eritrea, intervention in Iraq, the establishment of contact with Russia by land through Iran, and the occupation of Syria, were other desert operations of major importance to the British Empire.

Like the seas, deserts serve as communication channels for armies. The military importance of the deserts is a consequence of their geographical position. With the exception of the Mexican desert, the Kalahari in South Africa, and the Australian desert, the great deserts of the world extend almost in a continuous belt from west to east across Africa and Asia.

This belt of deserts separates the Mediterranean areas from interior and southern Africa, and the Russian areas from the English zones of influence. It constitutes the only possible land route between the French North African and equatorial colonies, and comprises the traditional land route of the caravans to the Indies and rich oil deposits.

Character of Desert

The common concept of the desert is that of a sea of sand extending beyond the range of vision, dune after dune under a burning and blinding sun. In places the desert does conform to this description, but uniformity of characteristics could hardly be expected in an expanse as great as the Sahara. On the contrary, one finds considerable variety of soils and climates. Alongside the sandy plains are mountainous deserts with barren rocks sculptured by wind erosion. These mountains are cut by wild canyons obstructed by boulders. There are also depressions filled with brackish mud and flat, stony, hard-surfaced areas stretching in vast plains, broken with sandy areas. In these desolate regions, the underground water in places approaches the surface, producing oases. Along the borders of the desert, moreover, are semi-desert zones with intermittent stretches covered with vegetation.

These zones possess one climatic feature in common: little precipitation with long periods of drouth. Deserts are zones of high barometric pressure. Nothing alters the clearness of the sky to oppose the heat of the sun's rays. This results

in excessive differences in the temperatures of day and night, as well as between summer and winter temperatures. Sudden changes of temperature also give rise to winds of extreme violence which raise great clouds of dust and sand, at times rendering travel impossible. Heat radiated from the extremely hot sand or stony surface during the daytime heats the air which is in contact with the ground and gives rise to the phenomena of mirages through reflection of light.

Rains are rare and places can be cited where rain has not fallen over a period of several years, but they are capable of assuming a torrential character. These sudden rains are not able to penetrate into the soil and flow off. The *wadis*, which are dry nearly the entire year, are transformed in a few hours time into violent torrents which are lost, farther on, in the sands or in some salt marsh.

Scarcity of water up to present times has limited military operations in the desert. Except where it has been possible by means of motor vehicles to transport considerable quantities of water, military formations have been limited to around a hundred men—at most a company. The extreme heat dries the skin and makes it necessary for men to drink from four to five liters of water per day. Consumption of so large a quantity of water fatigues the stomach and liver and is attended with the added danger of intestinal troubles. Intense perspiration, together with the sand which penetrates everything, can easily cause sores which become infected.

Granting that motorization has modified transportation, it has not been able to do away with all its uncertainties. Precautions must be taken to prevent convoys from losing their way, and halts must be counted on when sand or rain storms occur.

Historical

We cannot speak of the desert without thinking of the French penetration into the Sahara. Police operations against the nomadic tribes of desert outlaws were dominated by the space and extension of the desert. For mastering this space, they possessed only feeble means: a few posts lost among the sands, whose intervening spaces were patrolled by a few companies of *méharistes* (camel troops). The raids of the *méhariste* platoons illustrate the two principal and permanent elements of desert fighting: surprise and water.

Surprise is favored by the immensity of space, by the nature of the terrain, and by the speed and daring of movements. Desert forces must know the terrain, possess a good intelligence network, and protect themselves by security detachments. Water limits the number of men that are able to operate over one area.

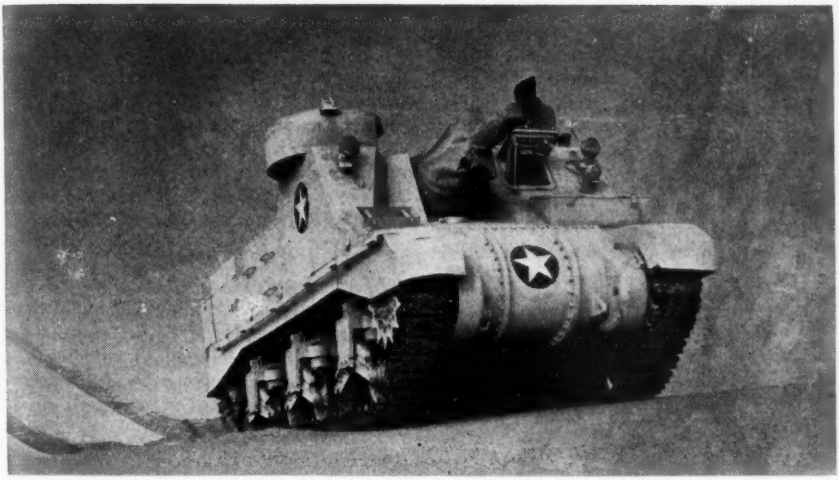
While the camel remained the sole means of transportation, French troops could not expect to surpass their adversaries in speed. Only strict training, endurance, tenacious will and the daring of young troop commanders, brought success.

For policing the Sudan and penetrating the Middle East, the English created the Camel Corps, similar to the French *méharistes*, and much later the Italians likewise created *méhariste* units, when their penetration into Tripolitania became effective.

In one sense, the pacification of the Sahara was too complete, and at the end of World War I, the commands of the southern territories felt but little need for trying out modern technical developments for facilitating the task of their troops. Order and security in the desert continued to be maintained, therefore, as in the past, by a scattering of posts and Sahara companies.

Motor Vehicles

Up until 1935, the French army displayed no interest in the matter. The



World War II showed that "if one is to conquer in the desert, he must possess planes, trucks, and daring." Above, American tank being tested in Egypt. Below, American vehicles stuck in typical desert terrain in Egypt, 1943.—Army Signal Corps photos.



few officers who attempted to make use of motor vehicles in the desert did it at their own expense and their own risk. Not until 1935 did the army undertake military tests with trucks and armored scout cars.

The different trials showed that it was unnecessary to insist on special vehicles or on vehicles with caterpillar tread. Standard commercial vehicles could be used providing a few modifications were made. The most important modification had to do with the tires, which had to have very slight pressure on the soil per unit of area in order to avoid sinking in light sand and to permit them to roll over hard



British scout car used on the desert from El Alamein to Tunisia.—Army Signal Corps photo.

and stony surfaces without excessive wear. Springs had to be especially strong.

It is desirable that the radiator be large, and complemented by a condenser to save evaporated water. The air intake and breather tube must be provided with very efficient filters for protection against fine sand, as also must gas tanks and carburetors. Gas lines must be of large diameter to avoid vapor-lock. Gas tanks, complemented, if necessary, by tenders for gasoline, oil and water, should be large enough to provide a wide radius of action (1,000 kilometers, for instance).

A desert vehicle with only two driving wheels can get stuck in the sand, but it is easy for it to get out by the use of folding grids and sand ladders, although much depends on the training and practice of the driver. In order to get over bad terrain, it is necessary that the vehicle possess considerable excess power. Around eighteen horsepower per ton is required.

British Experience

After World War I, the forces of the British regular army were insufficient for policing the desert in the usual way. It was therefore decided to abandon the static defense of isolated and dispersed posts with a system of a few large mechanized units, equipped for speed and a wide radius of action. The composition and doctrine of employment of the British motorized and armored units were established in the 1927 regulations. The equipment, constructed between 1922 and 1926, included tanks, armored scout cars on wheels, and trucks. Maximum speed was sought, the slowest tanks being capable of twenty-five kilometers per hour on the trail. In 1929, new tanks attained a speed of fifty kilometers per hour. The tanks possessed a radius of around 200 kilometers without refueling.

Motorized units were supplied with a number of trucks for transporting supplies and extending the radius of action up to 1,000 kilometers. The speed of movement and the tonnage which could be transported by truck gave a certain independence to movement, since the forces were no longer closely limited by the output of wells and other sources of water. The success of these units would be determined by their speed, maneuverability, and ability to attack within a few minutes after a long journey. Such a system required political intelligence, and a good communications system permitting prompt intervention at the opportune mo-

ment. The action itself can be usefully guided by air reconnaissance. The English possessed an excellent intelligence system, and they built airdromes which permitted rapid liaison and support of ground units.

Operations with Large Forces

Generally, desert troops will occupy strong points, widely spaced one from the other, only temporarily, or they will maneuver in columns with open flanks. Operations in the desert thus assume an extremely active form and are subject to rapid changes. Maneuver is a main feature, and the advantage lies with the forces which possess the best maneuverability and the greatest speed, both in attack and defense.

This lack of continuity in the front will be most pronounced at the beginning of a campaign, as the result of dispersion of forces, water requirements, and lack of suitable technical organization. There is also the necessity for maintaining a hold on certain essential centers of communication. Hence, bold raids carried out by a determined handful of men against the enemy's rear will always be possible. In the vastness of the desert, small forces can always escape notice, especially if they move at night, camouflage themselves by day, and remain off the usual routes of travel.

The history of World War II furnishes many examples of desert operations with large forces. In order to protect Egypt and the routes to India, and later the transportation of Allied supplies to the Russians, the English high command in the Middle East was obliged to fight in four directions—on the west against the Italians and Germans in Libya; on the south against the Italians in the Sudan, Eritrea and Somaliland; in the north in Greece and Syria; and on the east in Iraq and Persia. With the exception of the expedition into Greece, all this fighting was done in the desert or its confines. But it was really only in Libya that adversaries of the same quality and strength faced one another.

Defensive Operations

When a force is obliged by limited means to assume the defensive, the natural move is to withdraw to the edge of the desert to economize on transportation and lengthen the enemy's communication lines. The exact line, or the successive lines, on which the defense is prepared will depend on numerous factors. In addition to the terrain, water and the mechanical equipment available exert an influence on the points one will defend.

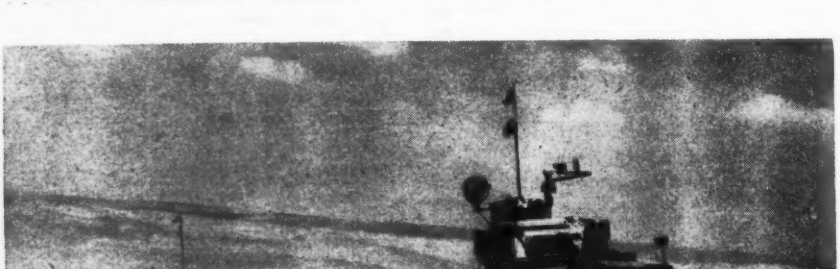
The defense of Egypt from June to September of 1940 shows clearly how these elements enter into the problem. The English had at their disposal 36,000 men forming about one armored division (the 7th Armored Division) and one infantry division (the 4th Indian Division). The Italians had, in Libya and Tripolitania, 230,000 men with four divisions in the Tobruk area.

Near Sollum, on the frontier, is a position which possesses natural strength, a rocky escarpment hemming in the coastal plain. It extends southeastward from Sollum, with Halfaya pass, accessible by winding road, as one of the few practicable passages. But Sollum is 480 kilometers from the Nile delta and water is scarce. The port of Sollum is not suitable as a supply port and there is no route from Sidi Barani to the frontier. The location of forces in strength at this position would have aggravated the problems of transportation and supplies; water would have had to be brought 200 kilometers.

The English command therefore decided to establish the main defense 160 kilometers to the rear, at Mersa Matruh. There the terrain is less favorable but the position could be anchored on El Qattara depression to the south. Water was sufficient and Mersa Matruh was the

railhead of a railroad extending to Alexandria, 320 kilometers to the east.

The position established by the British near El Alamein was continuous, with protected flanks, but this was due to exceptional local topographical conditions. Generally speaking, fronts to be defended are too extended to permit the creation of continuous lines of defense. The usual defense is a series of positions, echeloned in depth, in order to render it more difficult for the enemy to turn the position.



Light tanks, 1st Royal Tank Regiment (Great Britain) on Western Desert patrol.—*Soldier.*

After their advance in August, the Italians established themselves east of Sidi Barrani, between the sea and the escarpment extending southeast from Sollum. The troops were in camps of two to three thousand men, surrounded by low walls of loose stones and an antitank ditch. In these camps were crowded the artillery and tanks. This was the routine disposition adopted by the Italians in Africa.

The camps were disposed in a single line running southward. The average distance between the camps was too great to permit mutual support. At Sidi Barrani were the reserves, consisting mainly of one division of "black shirts." On 9 December, two English divisions passed through the breach in the early dawn and attacked the camps, one after the other, from the rear. The attack at Nibeïawa put the majority of Italian tanks out of commission. The absence of rapid forces in the rear rendered counterattacks by the Italians impossible. As a result, 30,000 English troops completely crushed 80,000 Italians.

Offensive Operations

More than in any other place, offensive combat in the desert is able to take advantage of surprise. Its success depends largely on the execution of movements and on transportation.

Surprise is favored by the immensity of space, and the great separation of the

opposed "fronts" before one side or the other passes over to the offensive. The occupied positions are often as much as a hundred kilometers apart because of supply and water problems. This lack of contact deprives desert forces of a source of valuable information. Patrols and prisoners will not, as a rule, supply information on anything but front line positions, and but little information on which to prepare an offensive. Only aviation and deep raids can provide this information on concentrations in the rear. It is evident that the aggressor must have air superiority. Deep raids require superb matériel and élite forces. Their execution is attended by considerable delays and they will therefore be relatively rare. It is not surprising, therefore, that preparation of an offensive in the desert should pass unnoticed.

It was thus that Wavell was able to prepare, in 1940, his offensive against the Italians. Tactical surprise was accomplished by the confident use of British matériel and troops in attacking 80,000 Italians with a force of only 31,000 men.

The 7th Armored Division of tanks with heavy armor, against which the Italian antitank guns seemed ineffective, added to the tactical surprise. The same element operated in favor of the Axis troops in Rommel's offensives. In 1941, the Axis air forces had concentrated sufficient means for air and sea superiority between Italy and Tripolitania. The English lacked, on the contrary, long-distance reconnaissance aviation. When their motorized troops had reached El Agheila area, south of Benghasi, their matériel was in bad mechanical condition, making long raids impossible. Added to this was the fact that the English did not have an intelligence network in Tripolitania before hostilities. Rommel was therefore able to move his *Afrika-Korps* into Tripolitania and surprise the English with an offensive.

In the second offensive of June 1942, Rommel profited from technical surprise. It was thought that the heat between May and September prevented extensive operations. Rommel was able to lead his troops into battle in June and July with refrigerated tanks and armored cars. In addition, he had at his disposal heavy tanks armed with long 75-mm guns capable of penetrating the armor of the English tanks at 2,000 meters, out of range of the 37- and 47-mm guns of the British tanks.

Movement introduces still another element of surprise. Long, rapid marches and ample turning movements permit surprise operations. Bold disposition of forces permits the concentration of all means in the attack of successive positions, which are thus crushed separately. The attacker in a turning movement can even abandon his lines of communication completely without fear of an enemy counterattack, for his lines will be protected by the vastness of the desert space.

Movements of several hundred kilometers require several days for their execution, and are not without risks. Moving columns in the desert may be spotted by enemy aviation. Generally the columns will move at night and camp during the day. The camp is dispersed as much as possible, protected by antiaircraft guns, and makes use of any existing irregularities in the terrain or expanses of vegetation to achieve relative camouflage. To avoid grave errors, it is necessary to have air superiority. Sweeping the sky with fighter aircraft will keep the sky clear by day of enemy reconnaissance planes over the zones traversed by the principal columns, protecting both these and the supply columns. Often, in order not to attract enemy attention, there is no preliminary reconnaissance of the terrain, although this may cause some delays due to unforeseen obstacles. Also, one must not forget the possibility of sand storms which may delay or even completely halt trans-

portation. Exact knowledge of local meteorological conditions and accurate forecasts are necessary before an offensive. The English attacks in Libya give numerous examples of daring maneuvers of this type.

The possibility of encountering an enemy column in the rear of an enemy position, where a motorized and armored counterattack is probable, demands a formation capable of immediate about face. At this point let us note the organization of the *Mot-Pulk* used by the Germans in 1942. It was equally suitable for deep penetrations in the Russian plains and maneuvers in the desert. In general, the *Mot-Pulk* had reconnaissance elements twenty to thirty kilometers ahead of the main body of armored elements. These were disposed in the form of an arrow point, in several columns, over a front of several kilometers, with light tanks in advance. Behind the tanks and on the flanks were motorized infantry, supported by antitank formations and self-propelled guns. Also on the flanks, but slightly to the rear, were the antiaircraft formations with the famous 88-mm *Flak-Pak* guns which also provided antitank fire. Finally, in the center, moved the reserve of infantry, engineers and supply columns, the latter transporting mainly motor fuel and ammunition and drawn artillery.

This disposition obviously could be varied, depending on the means available. The rounds of artillery ammunition carried by the column being limited, the action of the artillery was complemented by air bombing attacks. Support aviation was based far to the rear, but was directed from the column by an air support staff.

During Rommel's second offensive, the German armored column which had penetrated to the rear of the Allied position encountered English tanks at the trail junction of Knightsbridge. The success of the German tanks in this encounter was due as much to their tanks as to the support of antitank weapons, particularly the 88-mm guns.

In the attack of organized positions, the attacker is quite vulnerable against a defender who is dug-in and camouflaged.

Whenever offensive action is prolonged, much transportation is required. In order to shorten convoy distances, it is necessary to establish bases as close to the jump-off position as possible. In the Middle East the English perfected the organization of their supply service with a system of ground bases. As one gets farther and farther from his supply base, he must also supply water at times in addition to gasoline, food and ammunition. Thus the amount of supplies that can be transported is reduced, and this may limit the number of troops that can be engaged in a pursuit.

As soon as possible, bases are moved forward if other transportation can be employed. Thus, after taking Tobruk, which could be supplied by sea, the English base was transferred there, permitting continuation of the offensive. Loss of Tobruk, on the other hand, deprived 100,000 Italians of supplies in their retreat along the coast, where it is difficult to obtain sufficient water for such a large force.

The matter of bases and supplies is all the more important when large forces are engaged. Thus, at the time of the final offensive, Montgomery possessed 180,000 men. After the taking of Tripoli on 23 January 1943, he waited three weeks before attacking toward Tunisia, in order to organize the Tripoli base.

For limited operations, and in a defensive situation, one is able to compensate for the insufficiency of transportation between the base and the front

by establishing advancing depots. These can be supplied gradually by making maximum use of available transportation during quiet periods. This manner of operating is attended with risks, however. Even though carefully camouflaged, such supply dumps are in danger of falling into enemy hands, or warning him if his patrols are active.

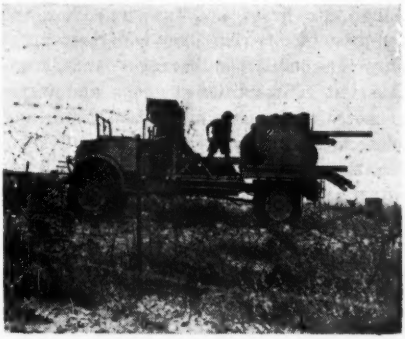
Attrition of Equipment

One other factor limits offensive operations. This is the wear on motorized equipment and tanks. Sand works its way into everything, including bearings of every sort, resulting in abnormal wear. In addition, travelling over rocky areas fatigues springs and cuts tires. Desert operations therefore require more repairs and maintenance than any other type of operation. After the first English offensive in Libya, the equipment of the 7th Armored Division was in such a deplorable state on arrival at Benghasi that it had to be relieved as quickly as possible. The 2d Armored Division, which replaced it, was hardly any better off after two months, and lost half of its equipment by mechanical failures and lack of experience on the part of its personnel during Rommel's first attacks. Provision must be made, therefore, for numerous reserve vehicles both for combat and transportation, and for repairs and salvage.

Modern Equipment

Until World War II, armies were apparently content to endure heat. Sahara troops had adopted types of clothing worn by the Bedouins, spacious clothing tight around the ankles with a piece covering the back of the neck during the day, with a roomy woolen outside coat for protection against the cold of the nights. The adoption of shorts and undershirts for daytime wear is not regarded as any great improvement by the infantryman who is obliged to lie in the burning sand to fight. On the other hand, dark glasses prevent excessive fatigue of the eyes in the bright sun. If marches are made regardless of the winds, tight-fitting goggles are necessary.

As to clothing, World War II did not see any improvement for desert fighters. Perhaps there will be developed clothing that will cool a person. A large number of substances are known which take heat from adjacent bodies by evaporation, acting as a coolant. But until we have such garments we limit ourselves to obtaining resistance to heat by acclimation and



British six pound AT gun used in desert fighting in Egypt, 1942.—Army Signal Corps photo.

training. It has been claimed that Rommel's men had special training in Germany, including intensive work in highly heated rooms.

We did see refrigerated vehicles and air-conditioned barracks and hospitals. In English tanks and armored cars, the air for cooling the motor was drawn through the front compartment of the vehicle, insuring sufficient ventilation and maintaining the same temperature as outside. But when the surrounding air is

at a temperature of 40 or 50 degrees (centigrade) and the tank is in the summer sun, the metal parts become heated to 70 to 80 degrees and radiate heat. The Germans installed a refrigerating device in Rommel's tanks in 1942. The outside metal covering was insulated by a layer of cork of 2-cm thickness. A small compressor maintained the temperature in the interior of the tank 20 degrees lower than the outside air, if ventilation was reduced and the air changed but three or four times per hour.

Air-conditioning of barracks appears to have been employed first by the American commercial firms that organized the Allied air bases at Massaua after the conquest of Eritrea. They constructed not only air-conditioned barracks and hospitals, but air-conditioned shops and warehouses, thereby obtaining greater working efficiency. During a campaign of some duration in desert climate, there will always be reduction of personnel due to sickness. Air-conditioned hospitals and barracks for the sick and convalescent are indispensable for the rapid recuperation of this personnel.

Water has always been the main problem in the desert. Motorization, however, has reduced this difficulty. There are no longer camels to water, and large trucks permit the transportation of relatively large quantities of water. All troops carried the water for their own use in containers. The field transports had tank trucks for water as well as for gasoline.

But the few and polluted wells of the desert could not be depended on for filling these tanks. It was necessary to construct numerous pumping and filtering stations with large reservoirs. The largest of these installations were situated on the Nile delta. For supplying advanced bases with water, where water was not sufficiently abundant, the logical solution was installation of water pipelines. Such a pipeline was the 320 kilometer line built from Alexandria to Mersa Matruh, passing through El-Alamein, with pumping stations at various points. Plants for distilling sea water were not employed, but the use of such installations must not be excluded.

The storage of perishable foods required precautions and cold-storage plants. After their arrival in Tripoli, the English quickly repaired the cold-storage plants there and increased their capacity.

Among the installations common to all bases, particular importance must be attached to motor vehicle repair shops.

Transportation organization must be very flexible, and use must be made of all available means; railroads, ships, airplanes, etc.

The improvement of trails will increase the efficiency of automobile transportation. This includes the marking of trails, the organization of relays and a system of fuel supply, the establishment of repair shops, and the widening of trails by mechanical means and explosives.

It may appear surprising that none of the forces engaged in hostilities made use of paratroops during the Libyan campaign. But the explanation is simple. German parachute troops had been decimated in Crete. As for the Allies, they did not possess sufficient air lift for such operations until the end of 1942.

We should note, however, that 5,000 men were sent to Tripoli by air as reinforcements. In future operations, airborne troops will play an important role in the desert, and it is probable that supply by ground will be replaced by transportation by freight-carrying planes whenever the round-trip required exceeds 1,000 kilometers; that is to say, whenever the advanced depots are more than 500 kilometers from the bases.

Let us note, also, that although there are still impassable areas such as the salt marshes of the Tunisian *chotts* or El Qattara depressions, special vehicles will be able to travel these terrains, increasing the possibilities of maneuver.

The tactical conditions of desert warfare have been summarized concisely by a German general who was made prisoner in Tripolitania: "The desert is the paradise of the tactician, but the hell of Section 4." If one is to conquer in the desert, he must possess planes, trucks, and daring.

British Foreign Policy and Strategy

Reprinted by the MILITARY REVIEW from an article by Cyril Falls in "The Illustrated London News" (Great Britain) 28 February 1948.

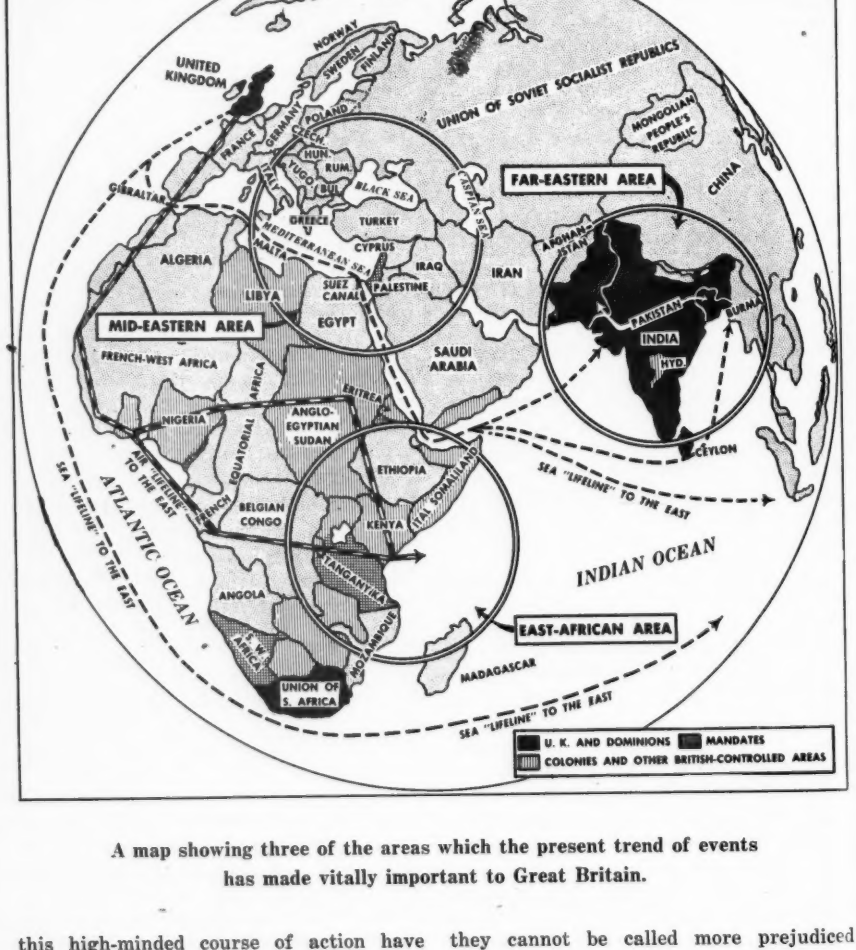
THERE are plenty of critics of British foreign policy today and some cross-currents in their criticism. In the main, however, there are two schools, one of which broadly supports Mr. Bevin (foreign minister), though it sometimes finds him lacking in precision and continuity of purpose, the other of which is strongly opposed to him.

The former is satisfied with the manner in which this country's dealings with the United States and Soviet Russia are conducted. It considers that the special relations which have existed between British and American foreign policies and in lesser degree between the military forces of the two countries are justified. Admittedly there is a leaning towards the United States and a leaning away from Russia, but the friendly critics hold that for this state of affairs Russia herself is to blame, and that any other course than that which is now being pursued would expose the nation to great danger.

The opponents, to put their case briefly, desire to swing us over into the Russian orbit. It might be said that there is a third school, which protests that we should keep out of either camp, but, though it contains earnest and worthy men, its advice is not practical. If we suppose a half-century to pass by without direct conflict between the United States and the Soviet, and the British Commonwealth to survive that period, then it might form an entity so strong that it could avoid attraction towards one of the two giant States. We have to think in terms of today, and today it is impossible to order our political life without reference to them and their rivalry.

The friendly critics do not display unquestioning admiration of the United States. They see in that great country a degree of materialism which makes some of them turn with relief to poor, shabby France and Britain, where they find that, amid increasing dishonesty and cynicism, an astonishing love of culture for its own sake survives. But they argue that no nation in possession of power as immense as that of the United States has ever made less brutal use of it, that no nation possessing great wealth has ever expanded it more generously in the alleviation of suffering and hunger, and that no nation with such facilities for spreading its opinions has even been more tolerant of those of others.

I consider these contentions to be true in the main, and I have already supported them previously. Some deviations from



A map showing three of the areas which the present trend of events has made vitally important to Great Britain.

this high-minded course of action have been advocated in the United States. There have been hints that economic aid should depend upon the adoption of a system of free enterprise by those who seek it. But these views have shown no signs of dominating national policy, and they cannot be called more prejudiced than those of groups in our own country which urge that, if there should be some form of union of Western Europe, it should be a union of Socialist States.

The voices from the other side proclaim that the United States is in effect pur-

suing "atom-bomb foreign policy" with regard to Russia and heading in the direction of an aggressive war against that country. American interest in Britain and the other nations of Western Europe, they say, begins and ends with the project of employing them as buffers against the power of the Soviet and advanced bases from which to launch attacks upon it. They are often prepared to admit that the attitude of Russia is far from ideal, but they consider that its deficiencies are the effect rather than the cause of the attitude of the United States. Russia's methods of seeking security may be condemned, but it is security that she is seeking, and nothing else. If this reasoning is correct, it follows that the best course of action is to draw further away from the United States and draw closer to Russia. On the one hand, she will not lead us into war, because she does not seek war; on the other, the United States will be restrained from attacking Russia if we are the friends of the latter. Thus there will be no war. The extremists among these critics go on to say that we should have nothing to do with the Marshall Plan, because it is directed against Russia. The moderates argue that we should accept the Marshall Plan, because we shall suffer a collapse if we do not, but that we need express no gratitude for aid rendered under it, and it need not prevent us from seeking an accommodation with Russia behind Mr. Marshall's back. I have recently come across the pronouncement of a moderate whose case is hardly parodied above, and I confess I prefer that of the extremists.

Admittedly there are difficulties and uncertainties in the situation from the British point of view. The century is still not half-through, but already there have been two gigantic world wars, in each of which the United States has remained uninvolved for a long period during which we have been in the thick of it. We were deeply grateful for the aid which we received on both occasions, but we see now that World War I marked the beginning of a sharp decline in the power and prosperity of our country.

World War II took this process a long stride farther and has left us in danger of financial ruin. After each of these wars, on the other hand, the United States took a bound forward. War did not increase its prosperity, because that is not the way of wars, but it enormously increased it relatively to that of the other nations of the world. We do not desire to go through that experience a third time. The prospect of providing bases for an American attack on Russia, and of taking the blows which come to advanced bases, has nothing tempting about it. If then, the doctrine of the objectors, which I have described above, were sound, there would be something to be said, considerations of morality being left out of account, for, so to speak, putting our weight on our left foot instead of, as heretofore in foreign policies, on our right.

Unfortunately, we might as well commit national suicide, because we should be putting ourselves at the mercy of a State which would either insist that we conformed to its own pattern, and that which it is setting up in its satellite nations of Eastern Europe, or destroy us and our way of life. Evidence has accumulated that the hostility of the Soviet Government towards Britain is even sharper than that directed against the United States. Where we are concerned there is an element of scorn, because Russia—or her Government—believes that we are living on a reputation which is, in fact, dead and done with, whereas in the case of the United States there is an element of unwilling respect. There is no such hostility towards this country on the part of the United States. Exas-

peration, yes, but not generally ill-tempered, while even those who most constantly proclaim Britain to be a sharper or a sponger in the international field hope to see it find a way through its difficulties. No physical risk to this country from the United States exists, even in the minds of the most bitter pro-Russian partisans, and, if there is any spiritual risk, it is remote. A risk from Russia does exist, and if it is not immediate it still cannot be called remote.

I should suppose that British foreign policy is based on these considerations, and I have no doubt that the appreciations of the heads of the British services are. They have to ask themselves where the danger lies and then take steps to meet it. They cannot conceive an aggressive war being launched against Russia under any circumstances, but they must envisage the possibility of a defense against Russian aggression being called for, even though they may hope and believe that it will not come to that. They think not in terms of an offensive, but in terms of that form of counteroffensive which is an essential part of defense. They seek to dispose their scanty resources with that end in view. Those who advocate a reorientation of policy, a leaning towards the Russian side, call upon us to consider that it would save us; we could, they say, come away from those regions, such as Greece, where we manifestly stand in fear of Russian infiltration, and thus save manpower and cash. If I thought that such a policy would lead to peace I should agree, because in present circumstances there is little one would not consent to in order to avoid war. To my mind, however, the effect of such a policy would be the opposite. It would, I think, rather tend to bring the possibility of war closer. It does not seem to me that Britain and the British Commonwealth can hope to avoid trouble by bowing to the storm. Their chances of survival are better if they give evidence of being prepared to face any storm that may arise.

The relations on which we stand at present with the United States are not created by sentiment, still less by perversity, but by the needs of self-preservation. Were the tensions to ease, we should doubtless revert to a more autonomous policy; were we certain we could avoid being involved in a world war, if another should break out—but that is a consideration scarcely worth discussing, so certain does it appear that either a world war must be avoided altogether or that we must resign ourselves to being involved in it. It is thus mere common sense that we should make our dispositions for defense broadly in accord with those of the United States, and especially in the Mediterranean, the area in which we have at present most interests in common. The argument that in so doing we are putting ourselves in a situation of ignominious subordination to American power seems to me absurd. I know enough of these matters to be able to say with confidence that the United States has not sought to dictate to us in peacetime strategy. The United States must be the senior partner in any such effort to maintain world peace because of her power and resources, but there has been no tendency on the American side to exploit that position in order to reduce us to the status of a satellite. Once again, this is not the way to bring on war, but a possible means of avoiding it.

The ills of the period between the rise of the Nazis in Germany and the outbreak of World War II proceeded from British weakness and lack of self-confidence rather than from any other cause. As a nation, we put our head in the sand —or under the bed clothes. I do not say that war would have been staved off had

we taken another course, but at least there would have been a better chance of preserving peace. Military efforts are unwelcome so soon after the conclusion of a costly and exhausting war and in a period of economic emergency, but if we cease to make them we may find ourselves in a situation still more unhappy than in the years preceding the last war. So let us keep our defenses manned, our outlying piquet well advanced and our inlying alert. Let us discuss these matters candidly with those we hold to be our friends, whether they are greater or smaller nations than we are. I can guarantee no more than anyone else that this policy will bring peace, but history and reason alike proclaim it to be the soundest.

Switzerland's Militia Army

Translated and digested by the MILITARY REVIEW from an article by Marcel Vernoux in "Revue de Defense Nationale" (France) January 1948.

THE French army at present is searching for a new form of organization. The organization of 1914, with its short enlistment, is no longer applicable; the one of 1938-1939 undeniably failed. What is more natural, then, than France should turn to the great Allied armies for a solution?

From the standpoint of tactics and strategy, there are no difficulties. France has a great deal to learn from its Allies with regard to armament and the structure of units and command. But when we consider the systems of training and mobilization for their military forces, we learn quickly that conditions are entirely different.

In Russia, mobilization was planned to proceed slowly, but France cannot afford any such delay since its entire territory can be invaded within a few weeks. In England, mobilization can also take place more slowly. In the United States, the problem is not one of mobilization but the creation of a methodically developed war machine on a pre-determined date.

Primarily, France requires a military organization capable of being placed in the field for immediate action with a minimum of delay. This must be done with a small permanent army, backed by reserve forces with only a short period of military service.

In considering France's problem, we can turn to the experience of Switzerland, which, with similar problems, has found solutions both original and satisfactory.

At first on the flank of one of the fighting fronts in World War II, Switzerland was gradually enveloped until she was largely isolated from the rest of Europe. By 1943, with the rest of the continent under a single master, Switzerland still held possession of the two principal transcontinental routes between the northern and the southern fronts. Thus affected by the war, Switzerland was practically on a war footing for a period of nearly six years, ready to oppose any attempt at invasion. Switzerland's clear stand on neutrality, which has commanded respect for more than half a century, is essentially a military stand that requires her to defend herself against any aggressor, and forbids alliance with any other power.

Swiss Organization

In 1938 Switzerland's army had been reorganized to include nine divisions (numbered 1 to 9) comparable to the French divisions; three mountain brigades, each

about equivalent to a small division (numbered 10 to 12); three light brigades on the basis of cavalry and cyclists (numbered 1 to 3); three fortified sectors (Saint-Maurice-en-Valais, Sargans, and the Gotthard); and a half-score of frontier brigades, charged with frontier police duty and covering of mobilization. The whole force was divided into three army corps, a fourth being created in 1940. If we add to this territorial troops made up of local battalions and industrial guards, there was a total strength of about 450,000 men,



Swiss guard at the French-German border.—Army Signal Corps photo.

which was reached on two different occasions during the war.

The first general mobilization was effected in August 1939. The army was disposed to meet an enemy on any threatened front. A southern attack being considered improbable, the Swiss general staff had the choice between a northeastern (German) attack, and a western (French) attack. By October 1939, the choice had been made, and on 20 October, two-thirds of the Swiss army was facing Germany, on the Limmat and the Linthe Rivers. Some of the mobilized forces were later released on long-duration leave.

At the beginning of 1940, the mobilized forces were reduced to 200,000 men, three army corps facing the northeast with six divisions, one machine-gun battalion, two light battalions, and one fortified sector.

Switzerland was stirred by the 10 May 1940 German attack in the west and the violation of Belgian and Dutch neutrality. German concentrations in the Baden area justified her fears. On 11 May, general mobilization was again decreed in Switzerland. On 16 May, the situation reached its crisis with the battle of Sedan. The Swiss felt that if the French resisted on the Meuse, the Germans would attack through Swiss territory. The French collapse temporarily relieved the tense situation for Switzerland, which was revived when the 45th French Army Corps crossed the border into Swiss territory.

At this time, Switzerland's defense was in its worse stage. The divisions, spread out over all frontiers, was incapable of effective resistance. While not hostile, Switzerland could not be considered friendly by the Germans, and it was questionable if the *Wehrmacht* would allow the only good railway lines between Germany and Italy to remain closed.

The Redoubt

Out of this situation the redoubt was born. The Swiss army had to be made capable of prolonged resistance, which was accomplished by reducing the length of the front which had to be defended, and by choosing mountainous terrain. This was possible since the stake of the struggle, the three tunnels of Lötchberg, Simplon and St. Gotthard, were in the very heart of the Alps. By convincing the German command that a war in Switzerland would be long and costly, out of proportion with the objective, Switzerland might possibly escape invasion.

The new Swiss defense was established between July 1940 and June 1941. There was no hesitation in sacrificing the rich and populous region of Switzerland, the plateau, where only a holding action was considered. The four Army Corps, anchored

in the west at St. Maurice, in the east at Sargans, in the north on the outer range of the Alps, and in the south on the main Alps and St. Gotthard, formed the square. In July 1940 General Guisan declared that "the object and principle of our national defense is to show our neighbors that war with Switzerland would be a long and costly undertaking. If we are to be drawn into the struggle, we must sell our lives as dearly as possible."

After the tense winter of 1940-41, the situation eased for a year, due to the German-Russian campaign. The Swiss forces were then reduced to less than 100,000 men.

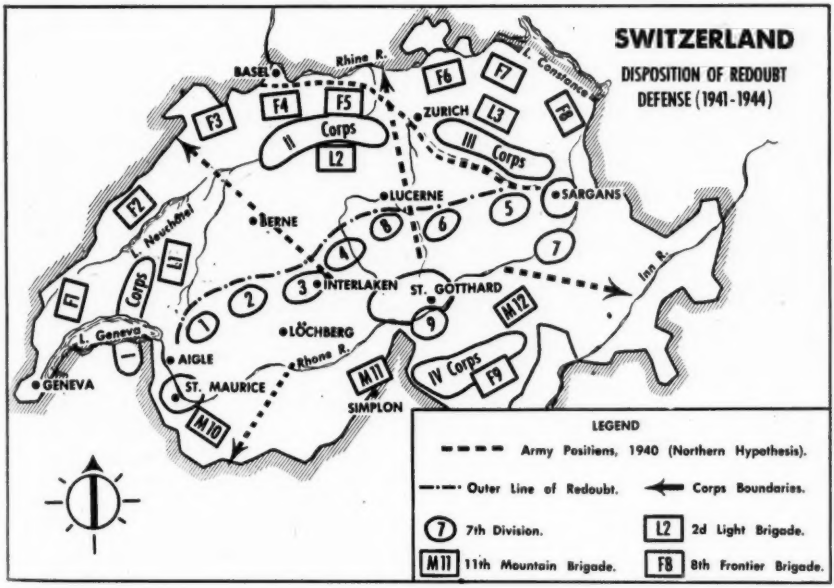
New Crises

The Allied landings in Africa in November 1942 and the occupation of southern France by the Germans again put Switzerland back into the center of operations.

In February 1943 the German press launched a campaign against Switzerland, and General Guisan believed, from intelligence reports, that it foretold military action. At this juncture, he made the bold move of direct contact with the *Wehrmacht*.

"It was at this time," General Guisan writes, "that I had a conversation with General Schellenberg, managed by the chief of the intelligence service. I believed that I ought not to neglect any opportunity for impressing on the minds of our neighbors on the north the feeling that our army was able to fulfill its mission under all circumstances, and would fight anyone who should violate our neutrality." Whatever the results of this conversation, the high command of the *Wehrmacht*, on 22 March, abandoned any plans it might have had to undertake a Swiss adventure.

There were still other crises for Switzerland: in September 1943, after the Italian armistice; in March 1944, when



Germany seized Hungary; in June 1944, at the time of the Normandy landing. But on these occasions the Swiss command did not order general mobilizations. In June 1944, frontier guards were called out by individual summons.

At this time the Swiss defense changed. There was no longer a German threat, but since the frontier was near the fighting armies, Switzerland had to be covered by police forces of considerable strength to avoid incidents. There was no crisis, but the new situation required large forces and the army was increased to 250,000 men.

With the approach of Allied victory and the collapse of Germany, there was a gradual disbanding of all units, and by 1 July 1945 the total strength of the Swiss army had been reduced to 15,000 men.

Defense Costs

During this six-year period, the Swiss worked ceaselessly to reinforce and modernize their military strength. Actual expenses during the war were: armament, 2,700 million francs; fortifications, 1,200 million; operating expenses, 4 billion; or a total of around 8 billion, while the normal annual Swiss budget is about 1,800 million. The 1,200 million spent for fortifications corresponded to 12 billion French francs in 1938, the approximate cost of the Maginot Line, and France's size and population is ten times greater than Switzerland's.

Despite these expenditures, the Swiss army is still far behind modern armies in armament, but a large part of her effort was directed to fortifications.

Before 1936, Switzerland had two fortified areas: Saint-Maurice-en-Valais and the St. Gotthard. From 1936 to 1941, a third region was created, Sargans, protecting the upper valley of the Rhine. The triangle formed by these three fortresses gives the idea of the redoubt. While from 1939 to 1940 a great deal of work was done on the frontiers and the army position on the Limmat, all work after July 1940 was in the Alps. This consisted of improvements to the three existing fortified sectors; construction of a continuous line surrounding the redoubt, facilitated by the steep walls of the outer range for more than two-thirds of the front; and a defense in depth over all penetrating routes.

The present-day traveller to Gotthard can see the extensive military defenses. Every four or five kilometers, or more frequently, he can see prepared demolitions, or antitank works protected by wire entanglements and casemates. The rocky barriers of the foothills are filled with immense galleries emplacing long-range artillery which can lay fire down on the few penetrating routes.

Fortifications

The Swiss system is neither a Maginot Line nor a Siegfried Line. It is not even a compromise between them. At first the Swiss placed artillery in large emplacements which provided long-range vision and fields of fire, to deny routes of travel over their entire length. During the second half of the war, part of the artillery, even heavy pieces, were placed outside the works and protected by reinforced concrete casemates camouflaged as buildings or holes in the rocks.

Each position is a placement for artillery, protected by an infantry position made up of medium and small works and road barricades. Airfields in the redoubt are surrounded by shelters for planes, and are protected against possible parachute landings by automatic weapons in the nearby mountains.

Along the roads are entrances to large subterranean shelters for ammunition, food, and hospitals.

Switzerland does not have a peacetime and a wartime army which is transformed from one to the other by mobilization. There exists only a certain number of

small and large units whose existence is continuous, but which in normal times exist merely on paper.

Nor does there exist for each unit a small, professional nucleus to keep records and prepare for mobilization. Professional soldiers in Switzerland are exceedingly few, numerically. There are only about 400 officers, 300 noncommissioned officers, and a few thousand men for depot and fortification guard duty. They form the nuclei of the general staff, of the staffs of large units, of the military authorities of the cantons, and of the schools. Small units are sometimes commanded by professional officers and often contain professional elements, but these are only special instances. The majority of units are commanded by militia officers—industrialists, merchants, agriculturalists, etc.—who continually give a part of their time to keep the muster-roll of their unit up to date, or prepare for the next training period.



Switzerland's defenses are anchored in her mountainous terrain. Above, Mt. Todi, near Braunwald.—Army Signal Corps photo.

Training

Each combat unit is called together every year for a period of three weeks to participate in "rehearsal courses," a combination of mobilization exercises and instruction. In fact, the entire unit is not called together each year, the men being called out only seven times in a

twelve-year period. But since the unit has an excess of personnel amounting to 10 per cent, an average of 60 to 65 per cent of the unit is called out each year. It appears that this is sufficient for a profitable period of instruction and training. This period also serves to integrate into the unit the new soldiers assigned as replacements.

New replacements arrive fully trained, for initial instruction is accomplished in recruit schools where all Swiss, at the age of twenty years, are instructed for four months. There is one recruit school



Swiss officers inspecting American mobile radar at Berne in 1945.—Army Signal Corps photo.

for each infantry division, two schools for the artillery, two for the cavalry, etc. After the third month of instruction, the recruits, now fairly advanced in training, are incorporated in the units to which they will thereafter belong.

Although units of the Swiss army do not actually exist except during annual exercises and in case of mobilization, they do possess a continuous existence. Each man keeps in his home his clothing, equipment and even his individual arms. He knows his own unit and division. Swiss cadres and men are acquainted with one another, have already worked together in maneuvers, and immediately on assembly are capable of being employed for any purpose.

Mobilization

The Swiss system permits not only general mobilization but several types of partial mobilization. It is sufficient, in fact, merely to post a notice that a division or brigade is called for "active service" to send all the men belonging to it on their way for assembly. Several times in the last war such a system was employed, particularly in the case of the frontier brigades. On the other hand, when danger appeared less threatening, it was possible to reduce the strength of the units with rapid recall possible. Two methods were used for this purpose; in one, entire units were released on leave, "active service" being performed by the units which remained. The other method was to release three-fourths of the men in a mobilized unit on leave, subject to recall, while the remainder of the unit protected the various installations.

Such a system is flexible, and France would have been fortunate in 1936, and up to 1939, to have been able to augment or reduce its army in such an orderly manner according to changing political requirements. It may be said in all sincerity that the Swiss mobilizations functioned perfectly. There is certainly something for France to learn in the Swiss military organization.

From the tactical viewpoint, the Swiss organization is not unusual, since it is merely an effort to adapt her army to mountainous terrain. From the standpoint of matériel, fortifications excepted, there is much to be desired. But the Swiss training and mobilization, on the contrary, presents an original solution which has benefitted from nearly a century of actual

experience. Although not engaged in a war during the past century, Switzerland has, on the other hand, carried out a great number of mobilizations, always in accordance with the same system, contenting herself with their continual perfection.

Switzerland became a federal state in 1848; but until 1875 there was no Swiss army, only the armies of the cantons. It was only after the Franco-Prussian war that the decision was made to create a federal army. In 1875 was instituted the basic Swiss military organization. Although modified in 1907, 1912, 1924, 1936 and 1937, its fundamental principle as an army of militia has not changed.

The influence of the Swiss canton has not entirely disappeared, however. The cantons retain the symbolic privilege of decreeing mobilization of forces up to 300 men. More effective, however, is the hold the cantons have on units, such as infantry battalions. These units bear the arms of their canton on their flags, and canton councillors have a part in the appointment of officers in their troop units.

Militia Army

Nevertheless, the Swiss army is now unified. It contains very few professional soldiers and is almost entirely made up of militia. The latter is divided, on the basis of age, into the *élite*, from twenty to thirty-two years, which make up the majority of the combat units; the *Landwehr*, First Reserve *(1st ban)*, from thirty-two to thirty-six years, which also make up combat units; the *Landwehr*, Second Reserve *(2nd ban)*, from thirty-six to forty years; and the *Landsturm*, from forty to forty-eight years of age, which make up, principally, the territorial forces.

There is also a *complementary service*, corresponding to the French auxiliary service, which includes age groups from forty-eight to sixty years.

The infantry units include *élite* battalions and *Landwehr* battalions. Some regiments are made up of one *Landwehr* battalion and two *élite* battalions. The cavalry used only the *élite*, while the other arms have units in which *élite* and *Landwehr* are mixed together. The frontier units even include members of the *Landsturm*.

Individual training is not given in the units. Recruit schools provide the basic training of the men. Along with each of these schools is a noncommissioned officers' school in which the duration of the courses, after completion of the recruit school courses, is three weeks. There are also officer candidate schools in which noncommissioned officers suitable for advancement to officer grade are trained and instructed for three months. There is also a Central School No. 1, in which candidates for captain spend six weeks; a Central School No. 2, in which the candidates for major spend five weeks; and, finally, a general staff course in which captains approved for passage to the general staff follow a period of instruction for fourteen weeks.

This training appears to be very short, but considered from the recruit school on up it is considerable. There are insufficient professional officers to insure instruction in all the schools, so it is necessary that the officers and noncommissioned officers of the militia assume the greater share of this work, at least in the recruit schools.

The Swiss is essentially a citizen-soldier and appointment to a grade, even of corporal, is regarded as an honor, and must be paid for in additional training. In the units, everyone is called up for seven rehearsal courses between the ages of twenty and thirty-two years, and for two other courses between thirty-two and thirty-six years. In addition, each Swiss

is called up annually for his regulation rifle practice, which takes place on Sundays.

Between the ages of twenty and thirty-six years, a Swiss soldier must train a total of fifty weeks; a noncommissioned officer seventy weeks; a lieutenant 100 weeks; a superior officer 132 weeks; and a general staff officer more than three years.

Russian Tactical Principles

Translated and digested by the MILITARY REVIEW from an article by Captain H. R. Kurz in "Allgemeine Schweizerische Militärzeitung" (Switzerland) August-September 1947.

IN *Krasnaia Zvezda*, the Russian Major General Perventsev deals with the problem of flank protection and the protection of boundary positions. Since the principal defense strength of a position must lie in its front line, and since fire concentration is less on the flanks, an adversary will attempt to strike the defender in the flanks. The same is true of the boundary positions between different units, which may easily be turned into breakthrough points.

Russian regulations deal at length with these two possible situations. Continual reconnaissance, which omits no areas, and observation of the surrounding areas, is given as a prime necessity for protection of these vulnerable places. The enemy's intentions are learned, thereby, and measures for one's own defense taken in accordance with them. Even natural obstacles on flanks are not to be neglected, for the enemy today always possesses means for surmounting them. The most effective flank protection consists in a carefully prepared artillery, machine-gun and mortar fire plan which must provide sufficient density of fire. In the case of boundary positions, the fire is to be crossed by the flanking fire of the adjoining unit. In the interest of the greatest possible continuity, fire plans are to be worked out on the terrain by the weapon commanders concerned; furthermore, special officers will be made responsible for vulnerable points.

If it is at all possible, the defense capacity of flanks and boundary positions is to be increased by organization of the ground, especially by means of mine fields. Antitank protection is of particular importance. Guns are to be so placed that their fire will benefit not only the main line of defense but also the boundary. Overlapping fire must cover at least one-third of each zone. Reserves have the double duty of destroying enemy forces which have broken through in counterattacks, and localizing penetrations and holding them until reinforcements arrive. Particular attention is given to prompt intervention by reserves.

River Crossings

The particular characteristics of the employment of artillery in river crossings are dealt with by Colonel Kurbatov. The employment of artillery at such times differs from that on ordinary occasions, principally in reduced preparation time. If the artillery of the units involved is sufficient to hold down the enemy, the crossing is to be immediately undertaken; if it is not, the operation is to be postponed until darkness, as otherwise the artillery fire might betray the attack. In case intentions are prematurely discovered by the enemy, all artillery means must be made ready.

Artillery plans take into account the following: crossing of the attack force; improvement of the bridgehead; breaking out of the bridgehead.

Duration of the artillery fire is dependent on enemy resistance and enemy

positions, the time necessary for crossing the foremost elements, the number of guns available, and the quantity of ammunition. It is indispensable that the enemy be held down and his positions be destroyed. As a rule, the duration of fire is not very long, but of great concentration. It reaches maximum intensity during the crossing period. The fire schedule must be precisely planned in advance, from the chronological point of view; in daylight attacks, firing begins with the beginning of the crossing; in night attacks, as a rule, not until the attacking forces have reached the opposite bank.

The battalion artillery and a considerable part of the regimental artillery as well as the tank destroyer units cross with the first attack echelon and collaborate in establishing and holding the bridgehead. One of their principal missions at this time is antitank defense. This artillery is broken up and distributed to even the smallest infantry units, for river crossings are such rapidly executed operations that immediate action and the utmost degree of readiness for action are imperative.

The remaining regimental artillery and the division artillery, from their own side of the river, hold the enemy artillery down and prevent counterattacks against the attack forces that have been carried across. This artillery is centrally commanded in order to be able to lay down concentrated fire. This fire is to be coordinated as much as possible with the fire from the bridgehead. Since the possibilities of widening the bridgehead are to a very large extent contingent on the artillery that is available, an artillery contingent as large as possible is to be transferred across with the first echelon. With this first echelon, at least a third of the division artillery, the regimental artillery and mortars, are to be transferred over to the other side. The remainder follows with the second crossing echelon.

Bridges must be built to cross the heavy artillery. When the latter crosses, one-third goes first while two-thirds remain behind ready for action. By the time the main forces arrive, the entire artillery complement of the crossing formation should be on the opposite side, provided the bridgehead is large enough.

The crossing of artillery units is difficult. A great deal of equipment, good organization, effective work on the part of military police, a good choice of crossing places, initiative, and bold action on the part of both officers and men are involved.

Tank Employment

Statements of Major Lushnikov on the employment of tanks are of interest since they show the Russian attitude to this effective but vulnerable weapon. The idea is emphasized that all other arms must help create favorable combat conditions for the tank in order that its advantages may find full expression. It is particularly necessary that aviation and artillery (self-propelled artillery) support the armored forces, and their duty is to attack and break up enemy armored formations before they get within range of the friendly armored forces. Only when the enemy is weakened and demoralized do the armored forces go over to attack.

Determination of the proper time for opening fire is of great importance. Armored combat is always fire combat whose outcome is vitally influenced by the time of opening fire, by precision, by rapidity of shifting, and by concentration of fire. The most accurate and, accordingly, the most effective fire is direct short-range fire. No tank must go onto the battlefield without a definite mission. Every movement of armored forces, even those of individual tanks, must always attempt to get into an advantageous firing position from which the enemy can be hit in his weakest spot. When the enemy tanks advance in open order, and the terrain offers no suitable places in which to take up position,

the armored commander will not infrequently be obliged to seek a defensive position from which the enemy is ambushed and taken under fire. Attacks will be opened from march formation when it is too dangerous to await the enemy advance on a given terrain line or when no protected firing positions are at hand.

The action of troops collaborating with the armored formations is of great importance. Only a general rule is given for this, namely, that all available combat means of advantage to the armored elements are to be employed. This signifies, accordingly, that the tank occupies a place of prime importance.

Aviation Teamwork in Canada

Digested by the MILITARY REVIEW from an article by Arthur Macdonald in "Canadian Aviation" (Canada) February 1948.

EVER since Canada's Army, Navy and Air Force were placed under a single authority in 1947, the service trend has been toward unification. Already there are joint medical services, combined pay and publicity departments, and standard officer training courses. This year, teamwork between the three services will spread into aviation with the Army and Navy expected to ease the burden carried so far by a short-handed RCAF. Nerve centers of the combined effort will be Dartmouth airport which the Royal Canadian Navy shares with the RCAF, and Rivers, Man., site of the RCAF-Army Joint Training School.

The Navy's preoccupation with flying is not new; it was announced more than a year ago that the peacetime RCN would be spearheaded by at least one aircraft carrier. The Canadian Army, however, is a comparative newcomer to the field. By the end of this year the army hopes to have three lightplane flights and a helicopter in the air; there will also be glider troops and a Special Air Services Company of five officers and 114 other ranks.

Airborne Forces

The Air Services Company, a parachute force, is now undergoing preliminary training at Rivers. When trained, its members will form the nucleus of Canada's airborne army, slated to consist of three infantry and two parachute battalions. The company will provide the necessary troops for test and development in airborne air transport operations and will be expected to maintain Canadian technique on a par with that of other countries. Parachute troops will also be available to back up the RCAF Air Search and Rescue Organization and will provide a public service by fighting forest fires and answering disaster calls.

Army officers report that competition for positions in the airborne army is extremely keen. It would appear that most of Canada's soldiers are anxious to get into the air—although risk pay ($30 a month while employed on airborne duties) must be considered quite an attraction.

Para-recruits have completed an intensified infantry course and have started actual parachute training with special exercises, elementary lectures and films. Their instructors are veterans of Canada's overseas airborne army who have taken advanced courses in the USA and Britain since the end of the war.

The next stage will take them to a mock tower, seventy-four feet high, which stimulates the last few feet of an actual parachute jump. Called the "psychological eliminator" by the school staff, this device is used to weed out unsuitable recruits

who will not be given further training. Those who pass move on to the high tower, presently located at Camp Shilo. This 256-foot steel structure tests the reactions of the student parachutist, gives experience in landing with weapons and other bulky objects and comes close to duplicating situations that might actually be encountered in the air. Not until trainees do the proper thing by instinct does the actual air work start.

Paratroopers make five jumps from RCAF Dakotas before receiving their wings. The first jump, called "slow pairs," is made from 1,200 feet with a novice and experienced man jumping together. Then comes "short sticks"—five or six men jumping from 1,000 feet. On the third jump, some equipment must be carried and a full stick up to twenty-one men may be dropped. Supply containers are added in the fourth leap and a small tactical exercise usually follows the landing. The fifth and graduating jump is a full-dress rehearsal with the whole company taking part in a mock airborne operation.

Postgraduate work includes jumps into lakes and other bodies of water, practice in "smoke jumping" to put out forest fires, and company drill. Altogether it will take about one year to turn out a fully trained paratrooper.

Although many graduates of the first course will return to their units for instructional duties, the Special Air Services Company will be stationed permanently at the Joint Air School. Like the glider force, it will engage in experimental work, while remaining on call for emergency duties.

Also based at Rivers will be No. 444 AOP Squadron—an army air observation unit responsible for artillery spotting and other air liaison duties. Formation of this unit has been held up awaiting delivery of winterized Auster VI's from Britain.

When fully operational, No. 444 Squadron will comprise two flights. Only the pilots will be army personnel; all maintenance and a large share of administration will be handled by the RCAF. A third Army lightplane flight will be set up for routine staff duties in connection with school operations and a Sikorsky helicopter, intended mainly for search and rescue work, has been ordered.

Naval Training

The Royal Canadian Navy is looking forward to its biggest flying year in 1948. Apparently the Government's action in slashing defense expenditures by some 25 per cent last January hasn't clipped the Navy's wings to the degree expected. By keeping fleet reserves down to a minimum and cutting supply and administration staffs, the Navy hopes to keep front line strength up to the level originally planned.

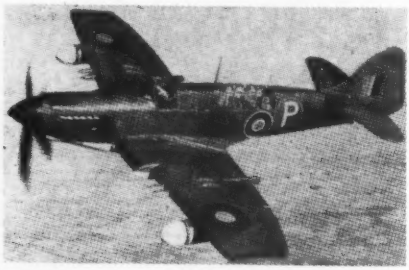


Canadian paratrooper training at Rivers, Manitoba.

The RCN is presently recruiting to

a total of 7,500. Of this total, approximately 15 per cent will be employed directly in naval aviation and as many more will devote part of their time in the supporting trades. The Air Division expects to be up to strength early this year and full scale air and groundcrew training will soon get under way. Most of the courses will be held at Dartmouth where a separate Naval Air section has been established.

The operational element of the Naval Air was completely reorganized in 1947. Instead of the original four independent squadrons there are now two groups of two squadrons each. No. 19 Group will work from the carrier *Magnificent*, due to arrive from Britain next summer, while



Fairey Firefly IV, first-line aircraft of the Royal Canadian Navy.

18 Group will be shore-based for conversion and refresher training. Aircrew and maintenance personnel will be rotated continually between the two groups. No. 19 Group, consisting of 803 (Fighter) Squadron and 825 (Fighter-Reconnaissance) Squadron, has been at Eglinton, Northern Ireland, converting to Sea Furies and Firefly IV's. Pilots and aircraft will be installed aboard *Magnificent* when she replaces HMCS *Warrior* next year. The two squadrons comprising No. 18 Group (826 Fighter and 883 Fighter-Reconnaissance) are presently aboard *Warrior* at Halifax, practicing deck landings with Seafires and Firefly I's.

Naval pilots seem highly satisfied with their first-line aircraft. The Sea Fury is probably the hottest single-engined prop-driven job in service anywhere. It does over 450 mph, has a ceiling of more than 41,000 feet and a range of some 2,000 miles—a performance considered sufficiently good to keep the Fury in service until a really suitable carrier-based jet aircraft is developed. The Firefly IV, a versatile all-purpose machine, is also impressive. It has a top speed in excess of 360 mph and will carry a variety of loads, including cannons, rockets, bombs and torpedoes.

The future pattern of aircrew training in the RCN is now quite clearly drawn. Pilots will be trained to "wings" standard by the RCAF; will later go to Dartmouth for conversion training. Here they will concentrate on "ADDLing" (Airdrome Dummy Deck Landings) and must become thoroughly proficient in the naval technique of dropping onto the deck before they will be allowed to test their skill aboard a carrier. There is a strong possibility that the gap between Harvard and Sea Fury planes will be filled by the Firefly trainer, although none of this type has been delivered yet.

All told, naval pilots will log about 360 hours before their first carrier landing—almost twice the time allowed during the war. And even trained pilots will be required to get in fifty hours on new types before attempting to set them down on a carrier.

While the Royal Navy intends to train combined pilot-observers for the peacetime Fleet Air Arm, the RCN will turn out specialists in each trade. Observer training is scheduled to start in a month or two with Anson and Swordfish planes being used in navigation exercises. As

in the RCAF, aircrew trainees will qualify for either short or long service commissions with a small percentage of long service officers going to the United Kingdom for combined pilot-observer training.

Dartmouth will also be the hub of the Navy's groundcrew training program. After receiving basic engineering training elsewhere, groundcrew trainees will receive instruction in Dartmouth on the actual aircraft they will later be called upon to service. It is planned that at least one operational type will ultimately be attached to the school.

One interesting commentary on naval flying: the groundcrew shortage which has plagued the RCAF since war's end is bothering the Navy very little. This might be attributed to the navy's "double appeal": ocean cruises and flying.

The Problem of Army Railway Movement

Translated and digested by the MILITARY REVIEW from an article by Captain Martin Schellemberg in "Revista Militar y Naval" (Uruguay) Supplementary Edition 1946.

WAR is fundamentally influenced and ruled to a certain extent by the means of transportation. Consequently, man has endeavored from the very beginning to solve the critical problem of transportation. His efforts have never ended because evolution has brought forth a constantly increasing desire for better methods.

As far as railways are concerned, metal tracks were first used to enable the movement of large, heavy loads. The Romans and the Egyptians made extensive use of them during the construction of the monuments which still defy the action of the centuries. Later on they were used extensively in mining, where horse-drawn rail cars managed to move ten tons at a rate of eight kilometers per hour.

The application of steam for industrial purposes was the real reason for the final advent of the railroad proper, marking the beginning of a new era and opening new horizons for human progress. France and England take the credit for the first advances in this respect in the Eighteenth Century with devices of limited value.

The research work carried out by Evans in the Nineteenth Century with the steam coach was based on the experiments from the previous century; so were those experiments conducted by Trevithich on track-railroads and adjustment of axles; and finally, the Stephenson's "Rocket" which featured characteristics of modern locomotives, such as cylindrical boiler, lateral pistons, water tender, etc. This was the beginning of a period of development in France, England, United States and Spain.

Mechanical means were developed simultaneously with the extensive developments of tracks; the bogie designed by the American engineer Levi Bissel; the Giffart injector for feeding the boiler; the compound system applied in 1876 by Mallet; and the superheaters tried by Schenit.

These developments were not the only ones; the turbo-interrupter locomotive, in its experimental stage, designed by the Swedish engineer Ljunström, came out to compete with the cylinder engine.

In the meantime, electricity entered the field and the construction of electrical locomotives using triphase current was initiated in Europe in 1896. The monophase system at 15,000 volts was successfully used in Switzerland in 1905 and afterwards continuous current at 600 to 3,000 volts was extensively used, especially in America.

From a military standpoint, the history of the profitable use of the railways for strategic transportation during operations, and for the tactical movement of reserves, has changed considerably since the beginning of the railroad. These changes were first justified by the principles and methods of conduct of war, and have now become a basic need with the increase of the striking power, the enormous theaters of operation and the total nationalization of warfare.

During the Atlanta Campaign of the American Civil War in 1864, the main supply route of General Sherman's Army consisted of 297 kilometers of railway which enabled 100,000 men and 6,000 horses to be maintained a considerable distance from Nashville, their base of operations.

Marcel Peschaud says in "Les chemins de fer allemands et la guerre": "The typical sayings of Marshal General de Moltke are well known; 'We are so thoroughly convinced of the advantages obtained from the initiative in war operations that we prefer the construction of railroads to the construction of forts. One more railroad across the country represents two days difference in the assembly of an army and accelerates that much more the initiation of the operations.' General von Schlieffen, addressing his first battalion of field railroad personnel, developed the same viewpoint: 'The railway has become part of the war machine and, without it, it is impossible to assemble and move large modern armies. The number of troops is no longer the main issue, it is the number of railroads available to the enemy. We no longer compare the courage and equipment of enemy troops alone, but also compare the capabilities of their railway facilities. Since 1866, and especially since 1870, we find ourselves going through a new phase in the conduct of war'."

General Ludendorff, in his memoirs, also blames the German railroads for their inadequate preparedness to wage a long lasting war and for causing, through inaptness, the German defeat in World War I. Nevertheless, the railroads were the means which made possible the "huge migration of more than 8,000,000 men and approximately 2,000,000 horses which were suddenly concentrated in the selected zones of operation to initiate the war of 1914-18."

The following figures extracted from Peschaud's book give a better picture of the importance attained by the railroads in the war of 1914-18:

	Germany	*France*
Locomotives in 1914	28,362	13,959
Locomotives in 1918	34,208	14,597
Passenger, freight and flat cars		
in 1914	719,387	419,709
in 1918	850,350	464,393

Colonel von Velsen, referring to train movement, fixes as 312 the number of daily trains moving to the French front between February and March 1918, and 431 trains daily from 13 to 20 March. On the Russian front, he reports 296 trains dispatched from Warsaw between 11 to 18 June 1916, and 494 troop trains and ninety-eight artillery trains from 1 to 8 July.

Modifications resulted as time went on not only in the use of railroads, but also in the technical developments of the equipment, their use and the whole variety of needs which followed logically, such as power and speed of the engines, form and weight of the cars, connecting systems, ramps, minimum radius of the curves, steel and construction work such as bridges, tunnels, roalroad crossings, culverts, rail stations and their annexes. The traffic control systems, operation control, coach-houses, engine yards, water supply tanks, coal and fuel storages and maintenance and repair shops have varied simultaneously with constant improvements of working techniques, tools and equipment.

The State and the Railroads

If the railroads are to be a part of a war machine, there is only one conclusion:

That the railroads are part of the army, and should therefore be under the direction and immediate control of the army for all military purposes. There should exist a well organized potential control body to run the railroads in case of war, and such a body should be properly trained in its duty to assure the efficiency of its performance. Above all it is necessary that the nation have available, according to prior plans of operations, all the railroads it will need in case of war.

General Gassouin says: "We should never curtail our investments in railroads because they are the determining factor of our economic prosperity in peace and of our victory in time of war."

Special Railroads

Going further in the study of World War I we find that railways were used with different types of rails characterized by the gauge, and therefore, by the use of different types of cars with varying capacities. Even lines of the same gauge were different as to their capability to absorb traffic in proportion to the unit weight of the railcars.

The French regulations which were in effect at the outbreak of World War II were based on experiences gained during World War I and established a second category of railroads composed of special military 60 cm gauge equipment. The operation of these lines was entrusted to the Army Command which had a definite organization for their operation and servicing and established their use as follows: These lines were to be used to extend the existing railroad lines from the resupply points; to allow the utmost utilization of the equipment throughout the course of war either during attack or withdrawal.

France had certain resources in transportation equipment and had them classified according to the tactical and strategic use to which they could be put. After 1918, France established a normal procedure coordinating the different means of transportation with varied gauges and components.

The standard gauge net, which was utilized to its full extent, was completed during the Champagne offensive in September 1915, with 200 kilometers of 60 cm gauge rail. This net originating at the permanent rail supply stations formed by a series of radial tracks connected by transversals, enabled lateral communication. It was constructed between April and September by unskilled, heterogeneous and insufficiently organized personnel.

An important 60 cm gauge rail branch 450 kilometers long was added to the main standard gauge system during the Somme offensive. Many difficulties were encountered during its construction work because of the lack of materials. French stocks were exhausted and supplies from America were received slowly. Lines were partially removed from the strongholds, shops were activated, private industrial branches were used and even one meter gauge tracks were utilized. As a result, it was common to find twelve to fifteen kilogram rails laying on wooden ties, others on steel ties, and sections of nine and even seven and one half kilogram rails on the same line.

During the Aisne offensive some 420 kilometers of 60 cm gauge tracks, comprising branches and transversals which spanned very uneven terrain, were laid simultaneously with the work on standard gauge. Repair and maintenance shops were organized.

The aforementioned authors, referring to the general offensive initiated in July 1918, say: "The 60 cm gauge branches organized at the time of the great offensives to permit deployment in depth and width over the whole front from Saint-Quentin to the Swiss border were completed. These were mostly developed in

the Second Army sector (Novon Saint-Quentin), where the area was completely without communication, and at Verdun. Independently from the work accomplished in the Argonne in 1916, in the Hesse forest and in the Northeastern sector, the tunnel-lines were partly restored and extended through the massif of Hauts-de-Mause up to Haudenville and Rattentout. This was not only the most difficult task because of the nature of the soil, but also the most hazardous. After the capture of Mort-Homme and of hill 304, the net was further extended."

When the nature of the terrain and the shortages of labor made emergency solutions necessary, the 60 cm gauge rails were used, with the effect being to reinforce and replace the standard and metric gauge tracks in certain defensive situations.

In the same manner, 230 kilometers of 60 cm gauge track were laid at a rate of two and one-half to five kilometers a day during the German retreat in 1917 between the Somme and Oise. This line ran over extensive embankments parallel to the standard and metric gauge lines. The needs of the French army in that sector were met not only through the maximum utilization of the standard gauge lines, but also by using the narrow gauge to a large extent over radial lines which extended up to the supply depots, thus preventing the piling up of supplies at the stations.

During the general offensive of August, the 60 cm gauge line was extended up to the rear of the First, Fourth, Fifth and Tenth French Armies following the troops' advance at a rate of 1,500 to 2,000 meters daily. In this manner 300 kilometers of railroad were laid which, together with trucks, assured the supply of these armies and relieved the standard gauge lines long enough for them to be repaired and completed.

Conclusions

A review of the history of railroads has been presented showing their utilization from a military viewpoint, and their organization in relation to the state. The purpose has been to present facts worthy of study to help arrive at a solution to the national problem of peacetime transportation for wartime use. The delineation of such a solution is a responsibility of those who are charged with war planning.

One conclusion appears at first sight: That it is impossible to follow the French prewar procedures strictly, because the nature and extent of the theaters of operation, the organization of units, and the needs to be fulfilled, are different.

Although the American railroads had less equipment in 1941 than in 1917, it was better equipment. Their physical plant generally was greatly improved, and as an industry they were much better organized to meet the emergency. In particular, the establishment of a strong central organization, the Association of American Railroads, was a noteworthy improvement.

Report of the Chief of Transportation

Development of India as a Base for Operations

Digested by the MILITARY REVIEW from an article by Lieutenant General Sir Wilfrid Lindsell in the "Journal of the Royal United Service Institution" (Great Britain) May 1947.

IT is true to say that the problems involved in the development of a major base for the maintenance of military operations on a grand scale are not generally well appreciated or understood.

A base is a very large area with its harbors, railways, power, light and water undertakings, its whole transportation and manufacturing capacity developed, coordinated and directed for the service of the armed forces, but not, of course, to the exclusion of the meeting of essential civilian needs.

In this last war it would perhaps be more nearly correct to say that the true base of our armed forces was the United Kingdom and the United States; but we had eventually a very fine base in the Middle East and a much bigger one in India, though both were subsidiary to the UK and the USA bases.

The determining factor in the scope of development of the great bases overseas is to be found in the problem of supply over immensely long lines of communication, liable to interruption by enemy action and affected too by shortages of shipping and possibly by weather conditions.

The line of communications to the Middle East while the Mediterranean route was denied to us by the enemy was around the Cape; the line of communications from the United Kingdom and the United States to India was the longest in the world. Hence the primary reason for the development of the Middle East and India bases.

The Middle East base was mainly in Egypt, but it had about 10 per cent of its development in the Sudan, and roughly 20 per cent of its capacity in Palestine and Syria and, prior to the separation of the Persia and Iraq Command from the Middle East, an important link also in Basra, Baghdad, and Mosul.

The Middle East base designed for the service of the Armies of the Nile, more especially the Eighth Army in the Western Desert, was not only the fountain of military resources essential for the invasion of Sicily and later Italy, but its central location in the Middle East made it an *entrepôt* of great value for operations in the Far East; and the development of India as a base cannot rightly be considered divorced from that of the Middle East base, as these two in varying ways at different stages of the War were complementary.

The developments of modern war taking place as wars now do at high speed over immense distances, demand that the highly mobile forces engaged shall be accompanied initially by floating bases, and shall be followed up step by step by advanced bases of varying capacity on shore. These in their turn may develop into something larger and more permanent, or they may be left behind and abandoned, to be recovered at some future stage. But these mobile, floating, or temporary land bases can only be of relatively limited capacity. The main bases of the United Kingdom, of the Middle East, and of India, are a permanent necessity however the war develops, and they take years to build, to equip and to stock.

Stages of Development

The development of India as a base must be looked at in stages. In the first stage we must have in mind India's traditional military problem of the defense of her northwest frontier. This problem was very real in the early stages of the war; and during 1939, 1940 and 1941 there was a definite threat to Afghanistan. To meet this potential threat, India's

pre-war base development was all planned facing west and northwest. This base development was planned, but very little developed for the maintenance of a force of 225,000 which was the pre-war strength of the Army in India.

When the war started, the Indian Army was largely unmechanized; and though plans had been made for mechanization, neither the necessary equipment nor the vehicles were available. Also, as 90 per cent of the population of India lives on the land, there were available only very small numbers of men with a mechanical training or a mechanical turn of mind. I do not mean to imply from this that India was not industrialized—seeing that



U.S. ordnance vehicle assembly line in India, March 1944.—Army Signal Corps photo.

industry is the basis of any base development—because Tata's steel works, for example, is the biggest steel organization in the world outside the United States. India's textile industry likewise was an important factor, and it proved a very valuable asset for the maintenance of our fighting forces and those of the United States in most parts of the world.

In spite of initial difficulties, we find India sending her troops in increasing numbers to fight in Persia, in Iraq, in Abyssinia, in the earlier campaigns in Cyrenaica and Libya, in France and in Norway. By the end of 1941 India had in numbers, including administrative troops, the equivalent of fifteen divisions serving overseas—a larger force than any other part of the British Commonwealth, not excluding the United Kingdom—these troops initially being very largely maintained from India.

More important still from the point of view of her own later base development, India sent her railways, track, engines and wagons, mainly meter gauge, and her river craft from the Ganges and the Brahmaputra to operate on the lines of communication of the Middle East.

The North African Western Desert line was partly built from material from the Indian railways, and the Iraq railway system and river line of communication of the Tigris were immensely helped by India. While the war lasted India never caught up again, towards meeting her own needs, on what she sent overseas initially to help the Allied cause in Western theaters.

By the end of 1941 the strength of the Army in India had risen to 900,000 and its base development was rising with it.

Then Japan entered the war, and a new stage of India's base development started. India had to do a complete rightabout turn and reorient her whole system of base development to face east. The strength of the Army rose to 1,675,000 by the end of 1942, and to 2,000,000 in 1943. Add India's own naval and air force expansion, add nearly 300,000 American troops and Chinese, and we get the full scope of the problem: a mixed force of five nationalities, if you can count India as one only, of over 2½ million men to be maintained spread over a continent which had only six or seven ports worthy of the name, which had in all only 1,-

000 more miles of railway track than we have today in the United Kingdom, and on that track mileage (40,000 miles) we had one-third the number of locomotives and one-sixth the number of cars which at that time were in use on the railways of England.

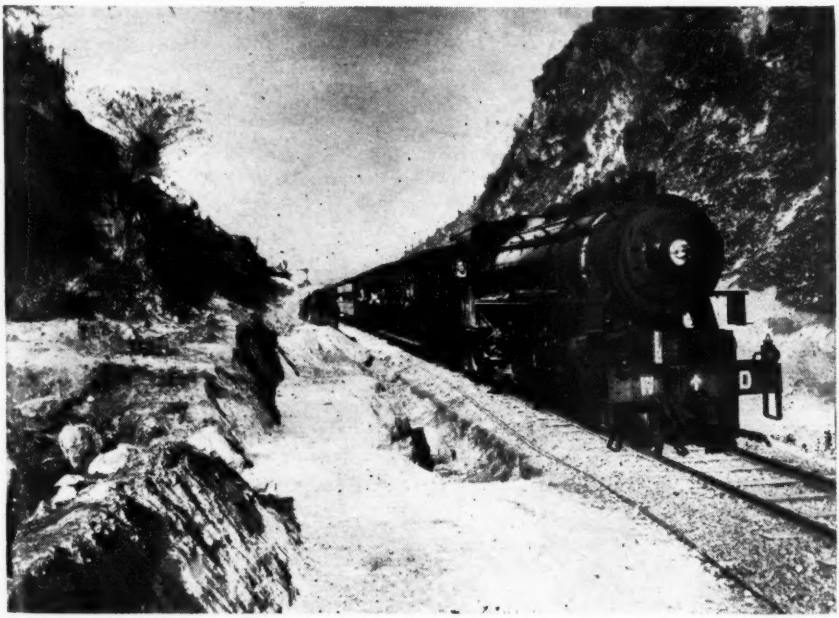
The Economic Background

In order properly to appreciate the problem of the development of India as a base it is essential to get a clear picture of India's over-all economic background.

The population of 400 million has no margin if an appreciable proportion of the output is diverted to meet military requirements. Any big reduction in consumer goods will cause terrific rises in prices, produce famine conditions in material supplies and serious unrest.

So we find the whole problem of the development of the India base dominated throughout by three economic factors; coal, food and transportation facilities.

In peace-time India was a coal exporting country. During the war we were compelled to import coal when we could get it. The railways under war-time use required 30,000 tons a day. Ships' bunkers, steel and the textile industry were heavy consumers. The extent to which we could meet the provision of the parachutes for the maintenance by air of General Slim's troops operating in Burma was governed entirely by our ability to supply enough coal to the textile mills engaged in their manufacture. To help



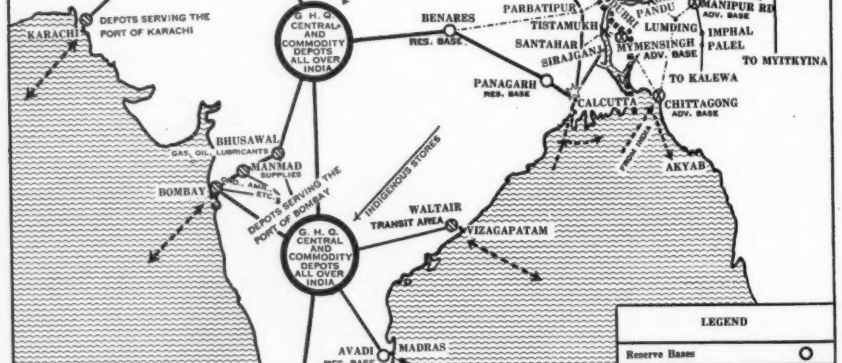
The Bengal and Assam Railway was a vital communications line in India.—Army Signal Corps photo.

meet our coal needs, open cast mining was developed almost entirely as a military enterprise in the last two years of the war to the extent that the open cast mines were producing nearly three million tons of coal annually.

A large part of India's population lives on rice, the remainder mainly on other food grains and little else. India cannot feed herself. The rice came largely from Burma, and when this source of supply ceased, an immense problem in feeding India was immediately produced. The import of food grains into the western ports rose to 100,000 tons a month; this produced serious problems in the ports and was a big additional load on the already strained transportation facilities.

Some of India's industries were of importance far beyond the requirements of the forces based immediately in India. The jute industry, the textile industry and the mica industry are three cases in point. Jute to all intents and purposes comes only from India; it is virtually a raw material monopoly.

Half a million Indian workers are en-



gaged in India's textile industry. The textile workers of the world are only fourteen million all told, so India's contribution was considerable towards meeting Allied war-time needs as well as her own requirements. The annual cloth output of India was 6,500 million yards. Of this, a minimum of 4,800 million had to be reserved for civilian consumption, 900 million yards went towards meeting service requirements, and the balance was exported to those countries who would have had nothing if the Indian quota had been discontinued. The Indian textile industry is in a unique position as regards the supply of tentage. 700,000 workers were employed on this alone.

India is practically the sole world producer of mica, and large quantities were required for the manufacture of electrical equipment. The Army had to help in setting up the necessary training arrangements, and we helped to organize the simultaneous training of 50,000 men for this industry.

General Headquarters, India, was a coordinating and directing force in the whole business. Everything of course depended on transportation facilities to and within India. Whether it was food supplies for the population, railway engines and cars for India's railways, coal for factories or for bunkers, or essential services, the directing voice was that of the Commander in Chief in India.

In September 1939, India had eight ordnance factories, including one clothing and one harness and saddlery factory. We expanded these to seventeen ordnance factories, nine clothing factories, two harness and saddlery factories, and two parachute factories.

India's Government factories, reinforced by civilian firms, turned out 3.7-in howitzers, light machine guns, optical instruments, rifles and all types of small arm ammunition, and also 25-pounder and 3.7-in howitzer ammunition. The quantities were not sufficient for India's needs, but they were a very valuable contribution to the over-all demand. India's railway workshops, in addition to the manufacture of rails, engines and rolling stock, produced armored fighting vehicles, hand grenades and shell bodies in large quantities, as well as helping in our vehicle assembly work.

Maintenance

Now I must try to tell more about the purely military problem of the maintenance—from the GHQ, India angle—of the Army in India and the forces of South-East Asia Command.

With the appointment of the Supreme



American fighter planes being unloaded at Karachi.—Army Signal Corps photo.

Commander, SEAC, the Commander in Chief in India ceased to be responsible for the operations of SEAC, but he remained responsible for the defense of India itself and for the provision, maintenance and training in men and material of the forces placed at the disposal of the Supreme Commander, SEAC.

The first major problem then became the development of the Assam Line of Communication by road, river, railway and pipe line. This line of communica-

tion was required first to maintain the Fourteenth Army on the Assam-Burma frontier and in Burma itself, second, to supply the American airfields in Northeast Assam the tonnage for their maintenance and for forward delivery by air over the "Hump" into China, and third, to make possible the building of the Ledo road and pipe line from India to China.

This Ledo road, the greatest military administrative effort ever undertaken in history to achieve so little, may perhaps have been a factor towards keeping China in the war when that distracted country may have been weakening in her determination to continue the struggle. If so, it was probably worthwhile. We shall never know the answer. The achievement was almost entirely American, and a very fine effort it was; but to the extent that capacity on the Assam Line of Communication was diverted to its construction and maintenance, just to that extent did the Fourteenth Army go short of its needs and had its difficulties increased in the maintenance of what was probably the most arduous campaign ever fought by British arms.

Our own two roads driven southwards into Burma to Tamu and Tiddim and beyond, notably the former, fully justified their existence and the labor expended on them, the Tamu road playing a major part throughout the final successful advances into Burma. The Tiddim road—once described as 400 miles of boulders held together by dust—was left behind by the development of operations. In 1943 the capacity of the Assam line of communication was 3,000 tons per day. The task set us by the Chief of Staff was to increase that daily tonnage capacity to 7,400 tons by January 1946. We did increase it to 9,000 tons a day by January 1945. We beat the daily lift ordered by 1,600 tons a day, and the target date by a year. Fifty per cent of the capacity was, however, absorbed by the United States Forces for building the Ledo road and for supply to China.

The Americans helped us enormously in the development and working of the Assam (railway) line of communication. This was a fine bit of cooperation between the American railway troops and the Indian railways, but I must emphasize that it was very much a combined effort and a very successful example of Allied cooperation. The Americans, too, built the mighty pipe line which, starting from Calcutta, eventually delivered oil to Kunming, China, for the maintenance of American Air Forces operating in that theater.

Maintenance Ports

The entry of Japan into the war called for a reorientation of India's main administrative lay-out. Looking ahead, it was Calcutta, Madras and Vizagapatam which would be required as the chief base maintenance ports in place of Karachi, Bombay and Cochin. So behind each of the three—Calcutta, Vizagapatam and Madras—grew up the great depot installations of Panagarh and Avadi, and the transit depot of Waltair, our hospital towns of Jellahali, near Bangalore, and a great organization of workshops, store depots, vehicle assembly installations, oil depots, airfields innumerable, base personnel camps and training establishments, tin and oil drums factories and filling plants, Naval and Air Force establishments as well as Army establishments. Though port capacity alone demanded the use of the western ports equally with the eastern, and we did in fact embark the force destined for the conquest of Malaya mainly through Bombay, we contemplated maintenance and evacuation primarily through Calcutta, Vizagapatam and Madras.

The eastern ports of India were a difficult problem. Calcutta was always con-

gested and limited by the difficult navigational conditions of the Hooghli to ships of relatively small draught, and very easily blocked by accident or by enemy action. Vizagapatam is a small port, and it has a narrow and awkward entrance. Madras is a good port up to its limits, but incapable of expansion and a danger spot in a cyclone.

Bombay is the best port, but on the wrong side of India for our main purpose. Thanks, however, to the military reconstruction carried out after the great fire and explosion of April 1944, it became a much better port than before.

Karachi was unfortunately badly served by railway, which wandered round northwest India for hundreds of miles in order to handle the grain trade of that area. Karachi was, therefore, ill served by railway for our military purposes.

The problems of India's ports were limiting factors at all times in our base lay-out and in the development of our maintenance plan. Similarly the limitations in the railway capacity serving these ports, and the immensely long hauls from base depots and factories in the interior of India, determined in large measure the size and scope of the base installations that we had to build and stock at Panagarh and Avadi. Those two base depots and a smaller port depot serving Vizagapatam were the key to our maintenance system as planned for SEAC's ultimately expected operations in the Malayan area. These depots were supplemented by others in the interior of India and backed by a hospital organization covering all India.

Base development demands engineer works services of considerable magnitude, and in India it meant the construction of 275 airfields with over 300 miles of runway; 1,191 miles of oil pipe lines and oil storage for fifty million gallons; hospital accommodation amounting to 150,000 beds; forty-nine million square feet of storage accommodation; personnel accommodation for 900,000 troops and 870,000 prisoners of war; 1,600 miles of roads and docks, camps, training establishments and defenses. The cost of military engineering services in India during six years of war was 260 million pounds, sterling.

The target as set by the Chiefs of Staff varied somewhat from time to time, as conditions in other theaters changed and resources began to become available for India and the Far East. We were providing a base at its maximum for twenty-seven divisions, 118 RAF squadrons plus thirty shore-based Fleet Air Arm squadrons and for varying-sized naval forces, and in addition, for 158 USA Air Force squadrons.

Summary

What did this imply? It meant:

(a) Development of port capacity to receive, handle and re-embark the necessary tonnage of stores and personnel.

(b) Development of the inland transportation system by rail, road and inland waterway to carry a vastly increased load.

(c) Development of the signal communications throughout the continent to carry a new and vastly increased operational as well as administrative load.

(d) Providing living accommodation in a land where little existed for European or American forces.

(e) Providing hospital accommodation for the vastly increased naval, land and air forces in a land where climatic conditions may be expected to give a high sick rate.

(f) Providing facilities for the basic and technical training for upwards of two million soldiers and airmen in India and for the acclimatization and specialized training of Europe and African troops from outside India.

(g) Providing storage accommodation

of immense dimensions in a land where little existed initially, and that little largely in the wrong place.

(h) providing food and canteen and amenity stores in a land that, generally speaking, provided little of the European class of goods of this category.

(i) Providing cold storage and oil storage, pipe lines and container plants for our own forces and aircraft and for supply to China.

(j) Building the airfields for our own and American use.

(k) Providing floating docks and naval repair facilities on a grand scale.

(l) Providing essential services of water, power and light, sewage disposal and laundries. At the same time it was always necessary to maintain sufficient of the civilian needs of the land to prevent famines of food or material and to insure essential labor facilities.

The Chiefs of Staff required of the Commander in Chief in India that the Indian base should be ready to function by June 1945. It was ready.

An Army in Africa

Digested by the MILITARY REVIEW from an article by Brigadier F. A. Clarke in "The Fighting Forces" (Great Britain) December 1947.

THE formation of an African army has been a vision on the part of many British officers who have served in the Royal West African Frontier Force or King's African Rifles. But the idea never met with encouragement at the higher levels.

It is true that we used African troops in the war of 1914-18, and that divisions of African troops fought with considerable distinction in Burma and East Africa in World War II, as well as serving elsewhere. But the formations were largely on a temporary basis, expanded with considerable difficulty with small peacetime establishments to which they are now reverting.

We are at present faced with commitments under the Security Council of the United Nations, as well as others arising from the aftermath of the war. These are additional to the constant responsibility for safe-guarding our world-wide communications, which involves the provision of garrisons and a striking force, or strategic reserve. There is, however, a shortage of manpower for our general needs, and this is one of the main factors which impose a ceiling on the number of men allotted to the Armed Forces. We cannot hope to survive as a first-class power unless our economic situation is improved, and unless we can, at the same time, maintain and equip adequate forces to meet our commitments and support our policy. Policy and strategy go hand in hand, but the politician is apt to ignore the necessity for providing the means.

Our African colonies are a source of manpower, much of it good fighting material. The population of the West African group alone is approximately twenty-six and a half millions, while East Africa has about fourteen millions.

African Potentialities

Though the exports of our colonies have been considerable in the past, tropical Africa still has immense potentialities as a producer of raw materials, particularly metals and edible oils. There is every possibility that the development of our African colonies on a hitherto unprecedented scale to supply world markets, and the consequent increase in the purchasing power of the natives, would go a long way towards a solution of our

economic difficulties. But the very value of these territories is bound to be a great factor in world affairs.

The strategic importance of the African colonies, particularly the harbor of Freetown, Sierra Leone, in the past decade need not be emphasized, nor the difficulties which would have arisen if the Trans-Sahara railway had been completed and in the hands of a hostile power. The expansion of trade in tropical Africa, however, may well be the cause of additional defense problems, besides intensifying those which already exist.

The army in India was developed as India grew in wealth and importance, and it was often employed in the defense of the country outside its boundaries. Since the situation has changed it seems only reasonable to maintain African formations for the same purpose. But there is a further aspect of the position, and that is the shortage of British manpower. It is suggested, therefore, that the African forces should be expanded to offset the loss of the Indian Army and to free British troops for building up a strategic reserve or similar tasks.

The future role of our African formations may then be summarized as follows:

(a) The defense of our African possessions.

(b) The provision of an expeditionary force.

(c) The relief of British units in certain colonial garrisons.

The first involves the local defense and internal security of the colonies, including the manning of coastal and static antiaircraft artillery. The expeditionary force would, in some circumstances, supplement the above by providing a striking force in Africa; in others it would form a contingent for service outside Africa, possibly in part fulfillment of our obligations to the Security Council. But, it must be realized that African troops are not suitable for operations or garrison duty in Europe, or countries with a similar or colder climate. In any case, the presence of well-trained and equipped troops in Africa would be an important factor in the maintenance of world peace.

Local Garrisons

There are many small garrisons which are necessarily maintained on our Empire communications. British units in these stations suffer from lack of training facilities and tend to deteriorate through boredom and climatic conditions. They should be replaced by African units provided and maintained by the forces in Africa. For instance, stations such as Aden, Ceylon, Mauritius, Jamaica and Bermuda would be suitable for African troops who would be quite adequate for the role required of them in those areas. African troops would also be most useful in Malaya.

If it be decided to maintain a large army in Africa, it would be a mistake to create an entirely new force. The existing units have great traditions and a record of faithful service extending over half a century. The necessary additions could be made to the old regiments by reconstituting wartime units.

In addition to normal training, African units in the past have always specialized in bush warfare. They should continue to do so. In fact, the African formations should be regarded as the Empire experts in bush warfare, both tactically and administratively, though they must also be capable of taking part in operations under more normal conditions.

The infantry and the bulk of the field artillery and engineers should be recruited from the bush, preferably from the recognized fighting tribes. In this connection it is essential that recruiting should be under the supervision of experienced officers working in close cooperation with the local civil authorities. The terms of service require thorough consideration. Short service with the colors

and a long period in the reserve is not suitable or popular with the African, particularly the bushman. Long service produces the better soldier.

It is considered that severely practical vocational training should be given to these troops, including instruction in English. In fact, the teaching of colloquial English should commence early in the man's service. Officer and NCO replacements in war have not time to learn the African languages, though it is advisable that they should make every effort to do so.

Well-Trained Cadres

A first-class cadre of officers and British NCOs is vital. They should be volunteers, whose conditions of service are made as attractive as possible. It has often been suggested that the Royal West African Frontier Force and King's African Rifles should have permanent British cadres as in the Indian Army. This course has the advantage that the officers and NCOs obtain an extensive knowledge of the troops, the country and the language.

A system of tours, with intervals of service with British units at home, would appear the best solution, officers and NCOs being replaced from their regiments as heretofore. As in the past, the local commander should have the power to dispense with the service of officers who show themselves unfit for service with African troops, including failure to acquire an adequate knowledge of the country and language in a stated time. For the sake of continuity it would, however, be desirable to allow officers holding certain administrative positions, and a proportion of warrant and non-commissioned officers, to serve permanently in the African forces.

The time for private armies is past; the African forces should be under the control of the Army Council, though it would be a mistake, and indeed wasteful, to impose the centralized War Office administration on such units. It would be much cheaper, and simpler, if as much administration as possible were placed in the hands of the colonial authorities.

In the Royal West African Frontier Force, King's African Rifles and Northern Rhodesia Regiment there exists the necessary nucleus for a much expanded force. But, in order to ensure efficiency and avoid setbacks it is essential that the expansion, recruiting and administration be based on experience, not wishful thinking; and that the British cadres be most carefully selected. Moreover, the organization must be such that there is a properly balanced proportion of the arms and services necessary to meet anticipated requirements and conditions. If this be done, then there is little doubt that, by greatly expanding our African forces, we can strengthen our world position and at the same time apply the principle of economy of force in the employment and distribution of our available British manpower.

It is essential that in our training we select men who possess within them the potentialities of leadership and, secondly, we develop those potentialities. This is best accomplished by giving the leader responsibility. The mere fact of responsibility will increase the leader's powers of decision and make him confident of his ability to handle any crisis.

Field Marshal the Viscount Montgomery